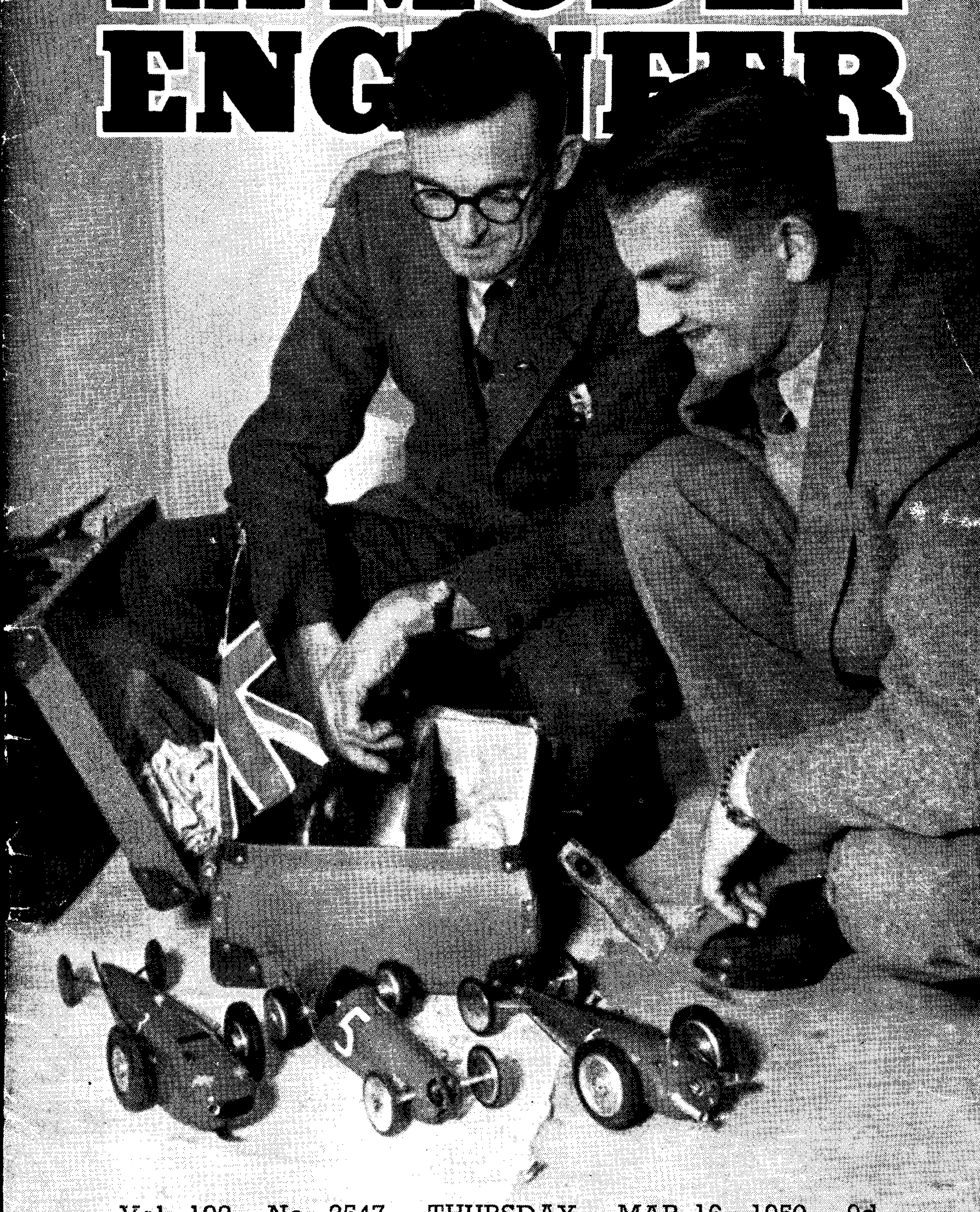
THE MODEL ENGINEER



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The MODEL ENGINEER

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SMOKE RINGS

Our Cover Picture

● J. A. OLIVER'S name is now a household word in the world of 2.5 c.c. miniature racing car enthusiasts, and his home-made models, seen here being admired in Stockholm by Erik Thorpmann who captained the Swedish team on their visit to this country, have undoubtedly done much to popularise their class. The outstanding condition of the British visit was that all models had to be home-made throughout!

Appreciation from Canada

● MR. H. J. REES, of Vancouver, B.C., in the course of an interesting letter writes: "Since Hitler started out on his last 'piece of fuss,' I have been busy with ships (cargo), building them during the war, and now doing repairs on them; but, believe it or not, I hardly ever pick up a copy of 'Ours' without finding something of real value to extend my little stock of knowledge along engineering lines. Yes, even in ship repairs; as it was only today that I ran across an article by Mr. Westbury on 'Reducing Valves,' which is going to help me from now on, I am sure. It had to do with the material for metal diaphragms. Thank you, Mr. Westbury."

Naturally, Mr. Westbury is gratified to receive so kind an acknowledgement of his efforts, and his colleagues on the editorial staff are glad to have the assurance that "Ours" provides help in an important business. But we consider that our main mission is to provide all possible help to readers everywhere; we cannot, of course, hope to help everybody with every issue, but we think that everybody will find something useful in each volume.

"The Model Engineer" Exhibition, 1950

● THIS YEAR, THE MODEL ENGINEER Exhibition will be held at the New Royal Horticultural Hall, Westminster, between August 9th and 19th inclusive, and competition models will be received on Tuesday, August 8th.

As this will be the twenty-fifth anniversary of "our" Exhibition, we ask that as many societies and clubs as possible will support it by displays of their craftsmanship either in the Competition Section, or by taking a stand which will be given to them free by the organisers.

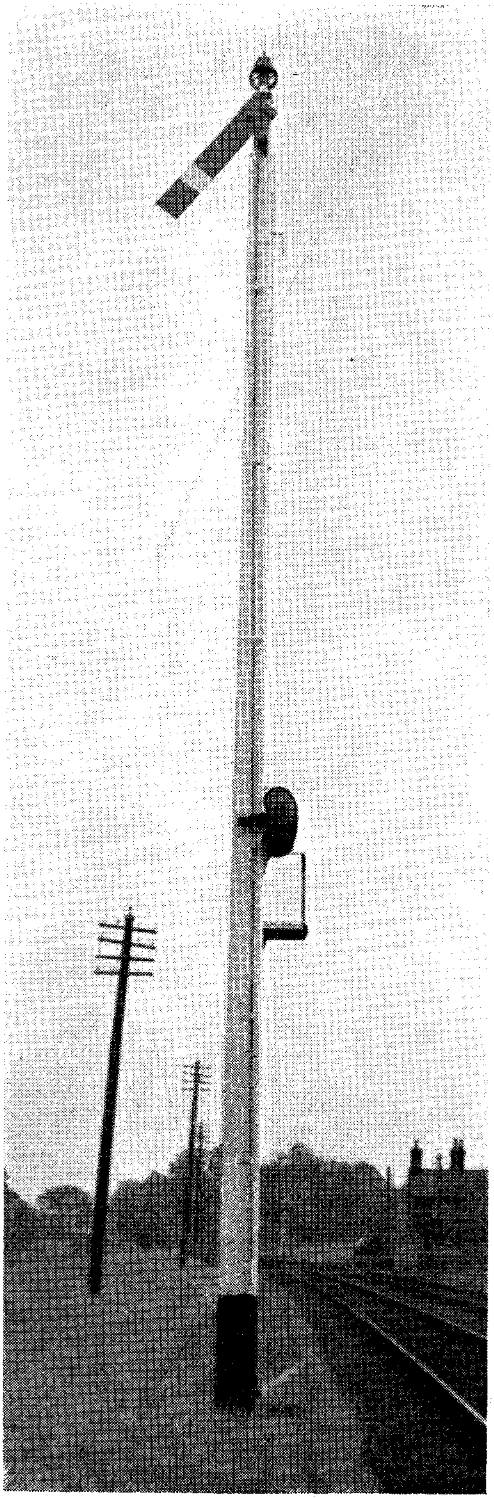
Where possible, models will be shown under construction so that the public may see the workmanship involved and be better able to appreciate the many fine examples displayed on the Competition Stands. Demonstrations will also be given of workshop practice illustrating recent articles in THE MODEL ENGINEER.

Competition forms will be available in April, and club secretaries are asked to write to the Exhibition Manager, 23, Great Queen Street, London, W.C.2, for any further information they may require.

A Sky-arm Signal

● SITUATED NEAR Silchester Crossing on the branch line from Reading to Basingstoke, is what we believe to be one of the last, if not actually *the* last example, on the Western Region of British Railways, of what used to be known as a sky-arm signal. As will be seen from the photograph, the arm is at the top of a tall post while the spectacles and lamp are at a much lower level; the idea was that the arm could, by day, be seen against a sky background, clear of trees, buildings or other objects behind it which might make it difficult to be seen by the driver of an approaching train.

Such signals were quite common at one time, on the railways of Britain, and they belong properly to the time when railway brakes were not so efficient as they are now. It is all the more remarkable, therefore, to find such a typical example still in use. How much longer it will stay where it is, we would not like to guess, because the Reading - Basingstoke branch is being transferred to the Southern Region, as from April 2nd next; on this date, the Railway Executive will be making certain adjustments to the boundaries of the six Regions which comprise British Railways. The Silchester sky-arm, therefore, will pass to Southern Region ownership, in effect, and its new owners may not care much for it! It is in very good condition, however, and is not very often used, because it protects an occupation-crossing that is not on a public road but provides a right-of-way over the railway between two parts of a local farm. The crossing is fully protected by signals which are operated, in conjunction with gates, from the crossing-keeper's cottage nearby.



The sky-arm is about 42 ft. 6 in. above ground level, while the position of the lamp and spectacles is only about 16 ft. from the ground. The arm and spectacles are both attached to the down-rod and, of course, move simultaneously when the crossing-keeper operates the lever in the locking-frame. In miniature, it would be an interesting and historic model to make.

The M.E.H.C. Reviving

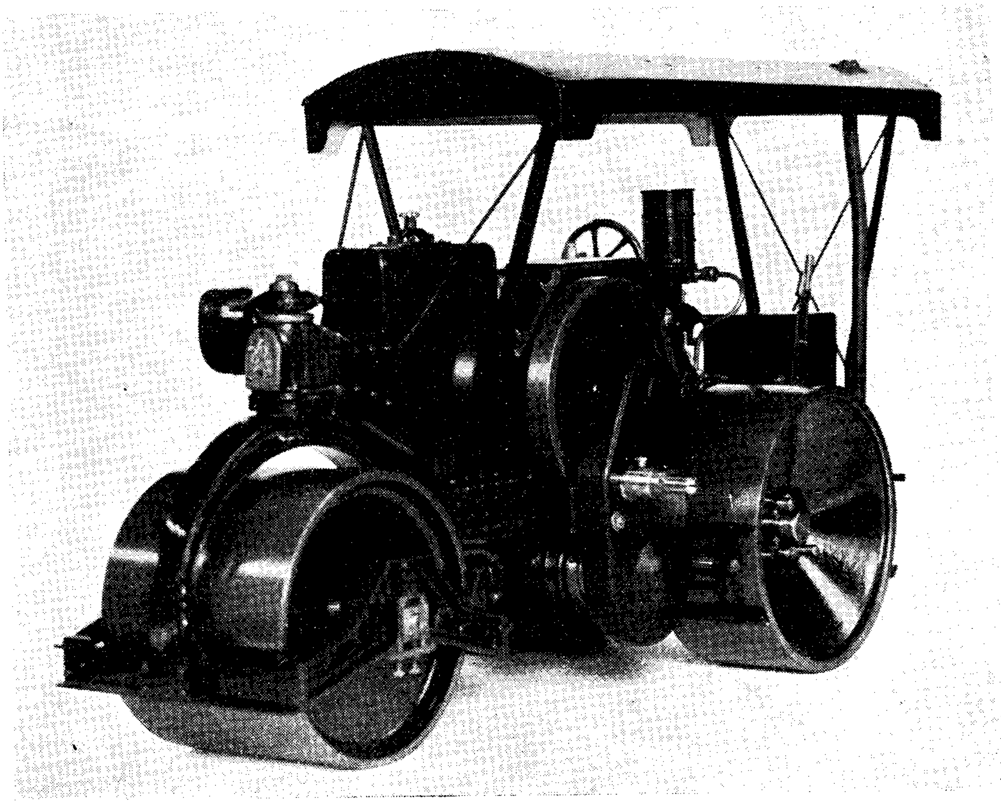
● MR. R. JESSON, hon. secretary of the Model Engineering and Hobbies Club at Small Heath, Birmingham, writes to remind us that the club has been in existence for five years, but its development has been hampered, up to the present, by the difficulty of finding a meeting-place. We are glad to learn that, at last, a small permanent clubroom has been acquired and that the severe handicap on progress has thereby been removed. Hitherto, meetings have been held at the house of one of the members, and some aeromodelling and model railway work has been done.

Mr. Jesson is anxious that the club's existence and activities should be made known to other interested readers in that area, and he will be pleased to give further information to anyone who writes to him at his address: 129, Third Avenue, Small Heath, Birmingham.

The Machining Tools for the "M.E." Road Roller

by G. H. Walter

WHILST machining the various components for a model of the "M.E." $1\frac{1}{2}$ in. scale diesel type road roller to Mr. Edgar Westbury's design, I made a few sketches of tools and kept notes of some of the more difficult jobs that were encountered; difficult, that is, in relation to a $3\frac{1}{2}$-in. lathe.



A front near side view of Mr. G. H. Walter's "M.E." road roller

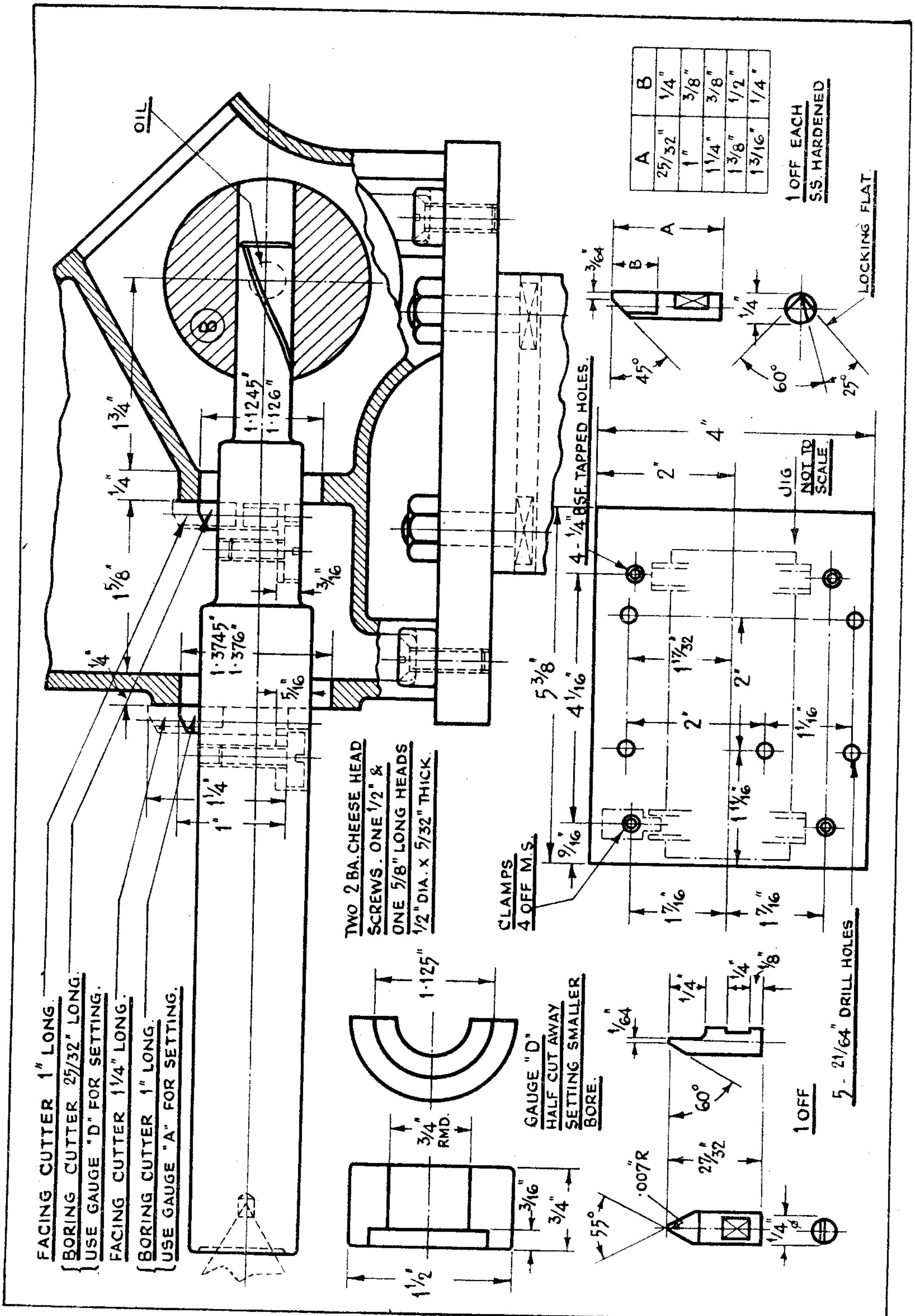
Particulars of these notes are given here with drawings of the tools, in the hope that they may be of service to others who may now or at some future date be making this model.

In passing, I would recommend this vehicle to any model-maker with the usual modest equipment of the average amateur, who is looking for something "to make next," as a real engineering job, which will tax his skill in all directions, and at the end will give him a sturdy and pleasing looking job, very attractive when circling or, if going straight, one which will not run away from him!

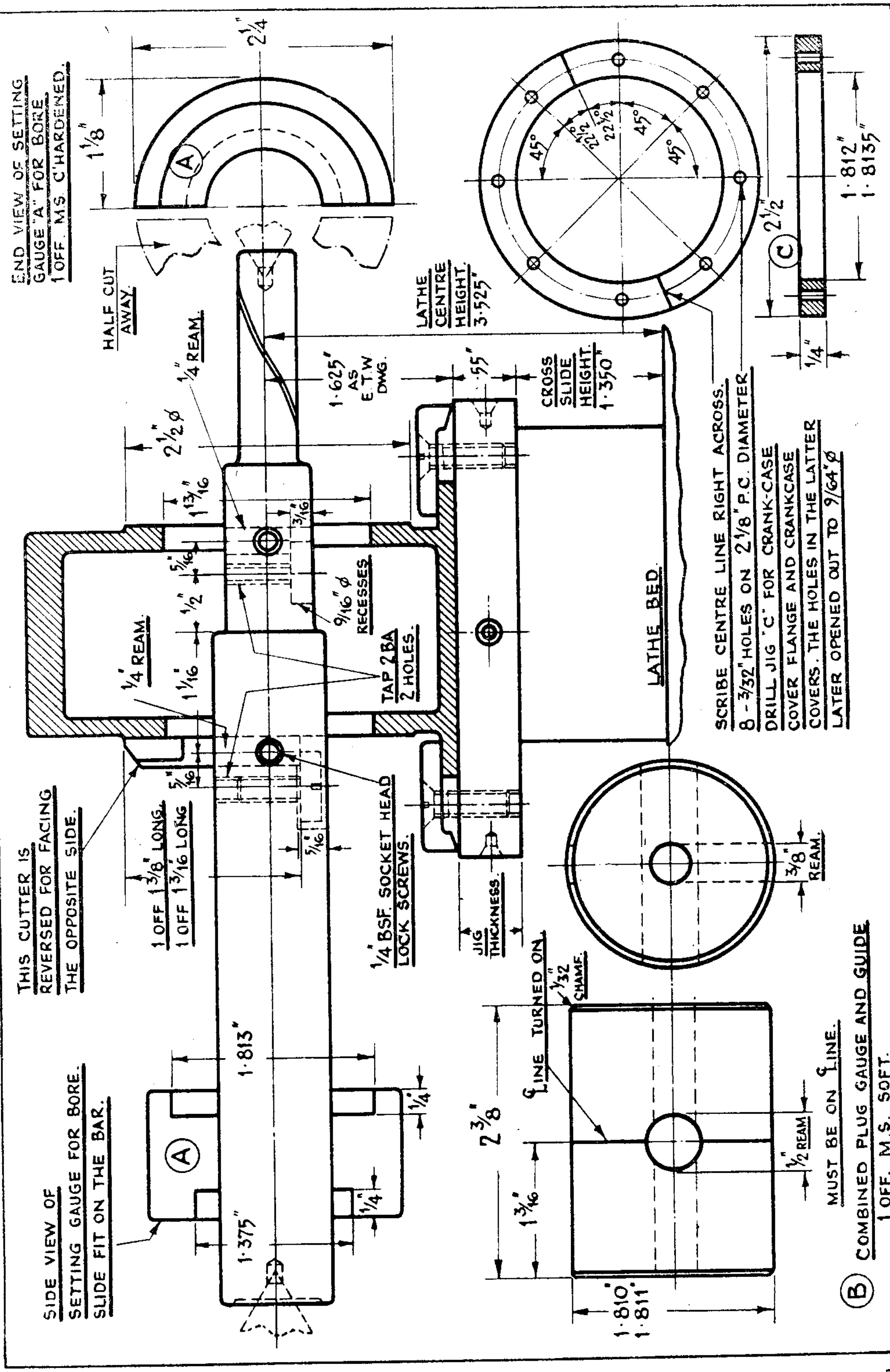
Although the drawings supplied are, on the whole, comprehensive, I personally detailed such parts as the chassis frame, chassis assembly and completed assembly, front axle section and assembly, brake and change speed lever cross-section, petrol tank, battery box and coil box details and arrangement. I did this mainly because I always like to be quite conversant with the parts I am making and because, perhaps, I always cross my t's and dot my i's. I should be pleased to supply prints of these to any reader if he will approach me through the Editor.

First then to the crankcase.

Clean up the casting all over, filing and smooth-



A	B
25/32"	1/4"
1"	3/8"
1 1/4"	3/8"
1 3/8"	1/2"
1 3/16"	1/4"


END VIEW OF SETTING GAUGE "A" FOR BORE. 1 OFF. M.S. C'HARDENED.
HALF CUT AWAY.
2 1/4"
1 1/8"
A
1/4" REAM.
LATHE CENTRE HEIGHT 3·525"
1·625" AS E.T.W. DWG.
·55"
CROSS SLIDE HEIGHT 1·350"
2 1/2" ⌀
13/16"
3/16"
5/16"
1/2"
9/16" ⌀ RECESSES
1 1/16"
1/4" REAM.
TAP 2BA 2 HOLES.
LATHE BED.
45°
22 1/2°
2 1/2"
1·812"
1·8135"
1/4"
C
SCRIBE CENTRE LINE RIGHT ACROSS.
8 - 3/32" HOLES ON 2 1/8" P.C. DIAMETER
DRILL JIG "C" FOR CRANK-CASE COVER FLANGE AND CRANKCASE COVERS. THE HOLES IN THE LATTER LATER OPENED OUT TO 9/64" ⌀
THIS CUTTER IS REVERSED FOR FACING THE OPPOSITE SIDE.
1 OFF 1 3/8" LONG.
1 OFF 1 13/16" LONG
1/4" BSF. SOCKET HEAD LOCK SCREWS.
JIG THICKNESS.
3/8" REAM.
1·813"
1/4"
1·375"
SIDE VIEW OF SETTING GAUGE FOR BORE. SLIDE FIT ON THE BAR.
℄ LINE TURNED ON.
1/32" CHAMF.
2 3/8"
1 3/16"
1/2" REAM
1·810"
1·811"
MUST BE ON ℄ LINE.
B COMBINED PLUG GAUGE AND GUIDE
1 OFF. M.S. SOFT.

ing any bumps and lumps, and finally paint all over the outside with a stiff mixture of chalk and water. Jam a piece of hard wood or fibre across the two holes cast for the crankshaft housings. Scribe arcs on these inset-pieces with the dividers set to a little more than half the diameter of the cast hole from four quarters—join the intersection of the arcs with two lines and at the intersection of the two lines indent the mean centre.

Stand the casting on the surface plate and adjust the scribing block point to coincide with the centres we have just found. If there is any variation, offside from nearside, compromise by choosing the mean. Transfer the scriber point to a vertical rule and take a reading. From this dimension, deduct 1⅝ in. (the drawing dimension centre to base) and lower the scriber point to this new dimension, then mark this height all around the base of the casting and lightly centre-pop every ½ in. or so around this line.

Next, mount the casting on the top slide of the lathe with a stud through the crankshaft holes and bolt down, after adjusting the casting until the scribed base line is parallel with the faceplate and at right-angles to the lathe bed. Then face away to the line, using a tool held in the four-jaw chuck and set out to describe a circle which will just clear the top and the bottom of the face to be machined. Feed the cross-slide very slowly until the metal is removed, splitting the pop marks on the base line. I use a special boring and facing head, which I made some years ago, for this operation, but until I had it I used the four-jaw. I intend to effect some modifications to this tool which, with the Editor's permission, I should like to describe in detail at some future date. Although simple, it is a very useful model-makers' tool for a variety of purposes.

Ready for Boring

The crankcase is now ready for boring and facing, and the lathe top slide should be removed. First, then, to check the centre height of the lathe. As the tailstock spindle of the Myford 3½ in. is 0.750 in. diameter, I chucked and turned a piece of mild-steel to 0.750 in. and having borrowed a height gauge, took a reading over both of these diameters and found the dimension in both cases to be 3.900 in. This figure minus 0.375 in. (or half the diameter of the test-piece and tailstock spindle) gives a lathe centre height of 3.525 in. The height to the top of the cross-slide was also found to be 1.350 in. Therefore, adding 1.350 in. to 1.625 in. (the required dimension for the crankcase), and deducting the sum from 3.525 in. it will be seen that a packing-piece of 0.55 in. thickness is required to line up the crankshaft cast holes with the lathe centres. This packing-piece constitutes a jig, details of which will be found on the drawings herewith.

Secure a piece of mild-steel 5½ in. × 4¼ in. × ⅝ in. for this and holding in the four-jaw, face off one side; next rub copper sulphate over this face and, when dry, mark out completely as shown here and drill and tap all holes. Now, with bolts inserted from the back, bolt the jig to the faceplate through some of the tapped holes, with, of course, the black side out and face away the second side until a thickness of 0.55 in. is attained.

Next, lay the jig flat on the surface plate and mark off half its thickness all round. Now stand the jig upright on its short edge, against an angle bracket and scribe a line, half its height on the two side edges, turn the jig and stand upright again, on its long edge, against the angle bracket and scribe a line, half its height, on the two end edges. At the intersection of these scribed lines centre-pop and drill countersinks with a Slocombe drill. Next, mount between centres on the lathe and face each edge, one after the other until the plate is 4 in. wide and 5⅜ in. long as the drawing. Mount the crankcase on this jig with four little clamps and screws, as shown, and after making sure that the crankcase is parallel with the long side of the jig, by checking on the surface plate, fasten down hard and do not move it again until all the machining is effected.

The reason for so carefully ensuring that the jig plate is a correct rectangle is that the edges are used to set square with the faceplate for each of the two boring and facing operations.

Boring Bar and Gauges

Now make up the boring bar and the gauges as the drawings here. These need no further description, I think, except to say that the cutters are ¼ in. diameter silver-steel rod, with flats filed for the locking screw, cutting edges milled or carefully filed, heated cherry red and quenched in water in the usual manner, which will be quite hard enough for this one-off job in aluminium. The cutting edges could be just touched on the grinding wheel after hardening, or else stoned.

Drill jigs *C* and *F* were, in my case, turned and drilled in the one setting on the dividing head I described in THE MODEL ENGINEER for June 26th, 1930, and those who have made this fixture or have other dividing means will find this easy and accurate. Otherwise, if marking off, centre-popping and drilling separately is to be done, it will be a help to turn a shallow vee groove, the pitch circle diameter of the row of holes in the rings as a guide to the centre-pop. With the tools completed, proceed to bore the crankcase by mounting the latter and its jig on the cross-slide with two tee-bolts, wind the saddle up to the faceplate and set the long edge of the jig hard against it and bolt down. Place the boring bar between the centres, through the cast crankshaft holes and wind the cross-slide either in or out to as near as possible the centre (the hardwood pads having been knocked out). Insert the cutter, adjust and lock up and take a light cut through the bore. Use a fairly high speed and slow feed with a touch of turps on the cutter and a good surface will be obtained.

Repeat the boring, finally setting the cutter to half-ring gauge *A* or 1.813 in. diameter, remove the bar and check with *B* which should be a push fit. Now replace by the facing cutter and face both outside faces to the drawing dimension. Next, clean down and turn the jig and job complete through 90 deg. on the top slide, winding saddle up to the faceplate, and with the short end of the jig hard up against the faceplate bolt down hard.

(*To be continued*)

MODEL CAR NEWS

BY WAY OF A CHANGE

With the reinstatement of model car news in this journal, we take this opportunity to welcome those of you who, hitherto, have not been regular readers of THE MODEL ENGINEER.

During the period in which " The Model Car News " catered for your interests, we endeavoured, within its limited capacity, to devote a fair share of space to the varied activities of our readers; how well this was accomplished has been expressed by countless letters received from all parts of the world. Now, however, our readership will be greatly increased and we sincerely hope that many of our older subscribers and followers will find sufficient interest within these pages to arouse constructive activity. Conversely, we have no doubt whatever that the wealth of added information of a general nature will stimulate and encourage those who, formerly, were concerned solely with the racing of model cars, to participate in that most fascinating branch of the sport, the design and construction of one's own model.

The editor will always be pleased to receive constructional and descriptive articles, and letters and club reports are also welcome.

A Home-Built E.T.A.-Engined Roadster

by C. Alford

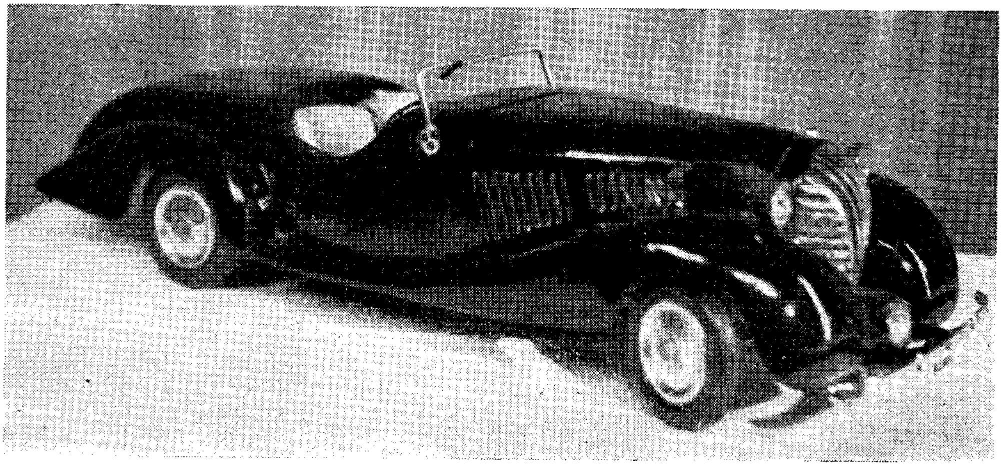
I FIRST started modelling seriously in a German prison camp, and on arrival home was able to continue with the aid of a few more tools; but I find I haven't the same amount of time on my hands! However, a start was made on a model car chassis—of hard sheet brass, cut to shape with a hacksaw and soldered into the usual section girder, upswept over front and rear axles. Engines were scarce just after the war, but a 10 c.c. " Typhoon " came my way and was duly bolted into place.

Having no lathe and only the usual hand tools cramped my style, so I had to buy the clutch and the " 1066 " Hastings road wheels.

The banjo-type back axle was the result of many hours' deep thinking, and as this is the component which causes most concern to the amateur with no machine tools, the method I used may tempt a few into " having a go." The main casing was obtained from the top of a hand-type car tyre pump, an inch or so of the threaded portion being cut off.

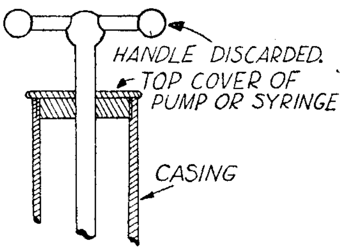
Two holes were cut opposite one another in the body to take a 6-in. length of steel or brass tubing of about $\frac{1}{2}$ in. o.d., which was then brazed to the casing.

Two tap splash-protectors were bought at Woolworths, cut to the shape of the casing and



The very roadster-like appearance of the completed model is evident in this picture

soldered into place to form the banjo. Two large steel washers were then slipped on to each end of the tube and soldered to form backplates on which to bolt the ball-race housings. The piece of tubing inside the axle casing was cut away, leaving the two half-axles in perfect alignment, and a search was made for suitable ball-races. An old vacuum cleaner motor gave me two $\frac{1}{4}$ in. i.d. races which were cut away complete with their housings, and then carefully filed away until they were a press fit into the reversed brake drums supplied with the "1066" wheels.



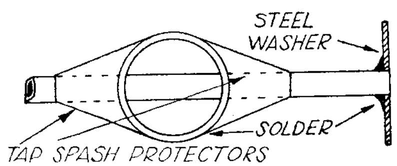
The portion of the pump which inspired the axle casing

6-B.A. bolts were passed through the drum housing and the steel washer, and all securely bolted down. A $\frac{1}{4}$ in. diameter silver-steel rod was pushed through the races and a "1066" crown wheel pinned on inside the casing.

A similar idea was carried out at the pinion drive end of the axle. A small ball-race, complete with its housing, was cut from an ex-W.D. motor, the housing drilled and bolted with 6-B.A. bolts and nuts to the top of the tyre pump, the threaded portion of which was screwed down until the pinion meshed with its crown wheel.

A small ring was soldered to the inside of the rear of the axle and a dome cover (brass wash-basin stopper) bolted into place. An oil filler and level indicator completed the axle, which has never given any trouble since installation.

The front axle was built of I-section brass

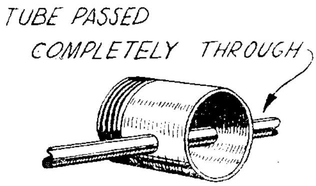


This sketch shows how the rear axle was fabricated. Note the application of the tap splash protectors

and has king-pins with correct steering and linkage, and is adjustable for tracking.

Papier Mache Body

The body of the car was made of papier maché, an ideal way of producing the double curvature of the modern car body. A wooden body was built first—well soaped, and then strips of paper glued on, layer after layer, until the desired strength and thickness was arrived at. By this method, it is possible to build up strength where it is needed most by burying thin pieces of ply into the layers. When hard, the paper shell was sand-papered and then covered with silk, glued on. Several coats of filler were applied and then the body was carefully eased off the block. All edges were trimmed and most of the detail added to bonnet and cockpit. The whole body was then given six coats of black dope, each one carefully rubbed smooth with wet and dry paper. The last coat was lightly papered down to remove all brush marks and the final polish given with a soft pad dipped in "Brasso." A deep, lasting lustre was the result.



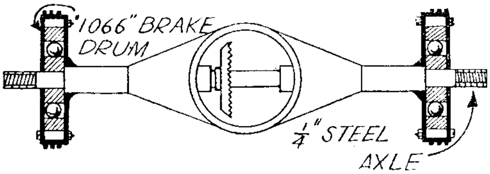
The initial stage of fabrication

Headlights

These were the nose-cap protectors of small calibre shells, the tips of the protectors being cut off, chromed and fitted with Perspex "glass." Bumpers were fabricated from brass curtain rail and given a "bright dip." The overriders were riveted on to improve appearance. A steel mirror, cut and bent, formed a Triumph Dolomite type radiator shell. The crocodile-type bonnet is spring-loaded and when open gives complete access to engine, controls and tank.

Built-up Road Springs

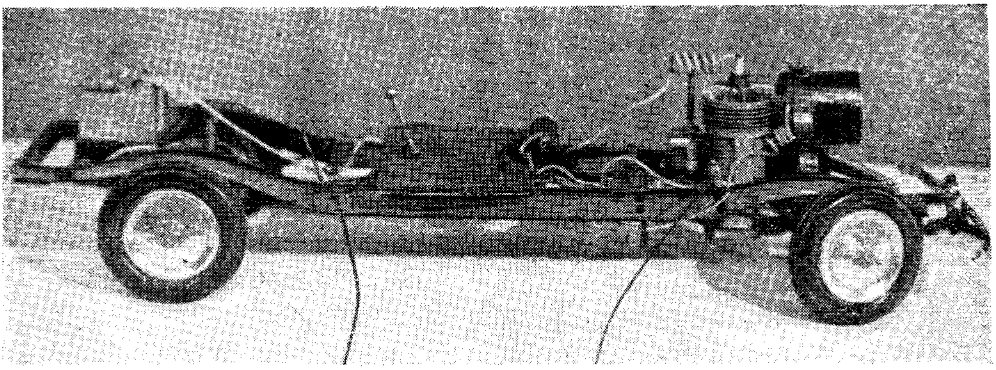
Road springs were built up of clock springs, alternate leaves being of fibre, as I found that



A section through the completed assembly, showing ball race installation

twelve leaves of spring stub gave too hard a ride. It is easier to punch the centre bolt holes through each leaf than to try and drill them. Clips and shackles were added to improve appearance. Telescopic shock absorbers came already made—the spring-loaded contacts of electric light sockets.

The dash board is of polished wood ; a glove compartment is fitted, and the seconds-hand faces of old wa.ches were used for instruments.

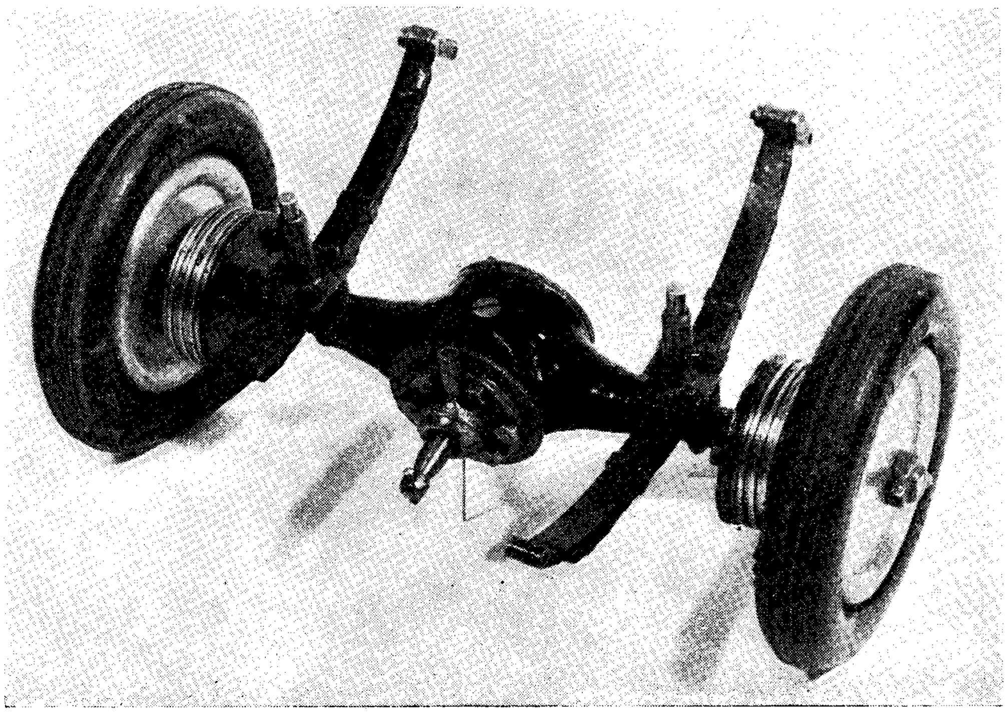


A well-planned chassis layout, with the engine in the right place !

The gear lever is actually the ignition switch when fitted with its extension. Two "Nife" batteries are carried in a box to the rear of the back wheels.

Performance on its test run was marred by a clutch that refused to slip, and later by faulty ignition. Recently, an E.T.A. 5 c.c. diesel ousted the petrol engine and I have had some 35 to 40 m.p.h. on my small garden track with 8 ft. line.

So interested have I become in model car construction, that I now own a well-fitted workshop, including 3½-in. Myford lathe, my own race track—1 ft. wide and 8 ft. radius—and I have built seven cars and produced bits and pieces for many others.



The back axle and suspension assembly after several miles of hard running

J. Handel's Mobile Test Bed

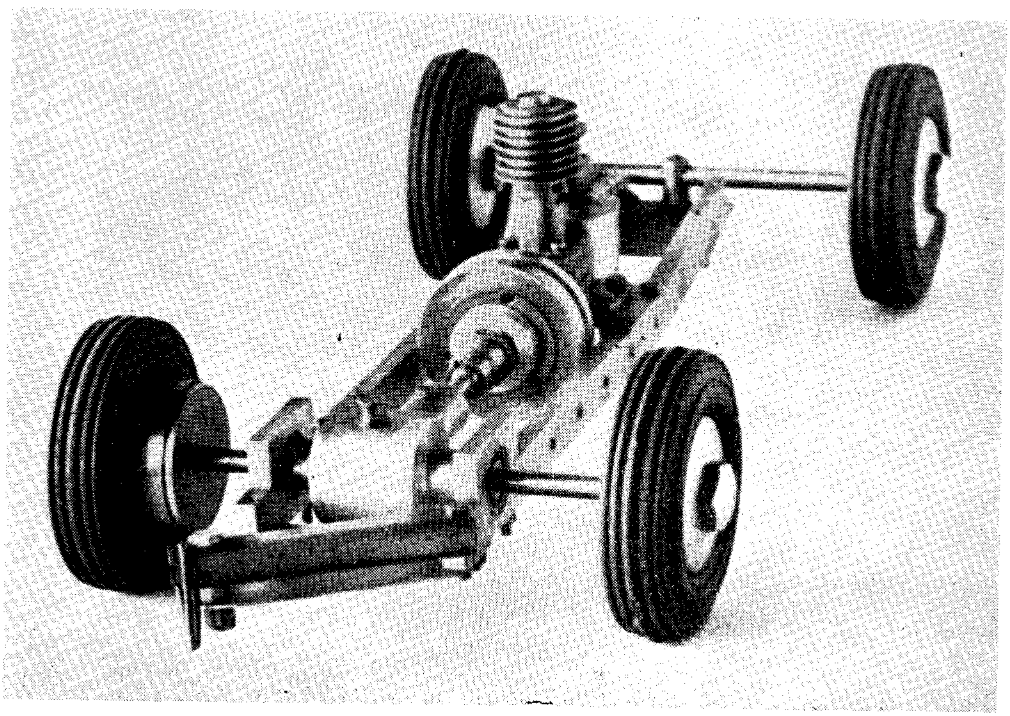
I SHOULD first explain that my interest in model cars is primarily in the engine department and that this chassis came into being solely with the object of carrying out comparative tests of various engines before and after various things had been done to them. It is, therefore, extremely simple, and was, in fact, built in a week-end to test a modified E.D. 2 c.c. i.c. engine. Subsequently it has run with a 10 c.c. O.K. Super-60, a 1.3 c.c. Mills and a "Kestrel," the only modifications necessary for each engine being a new engine-bearer plate.

"Add More Lightness"

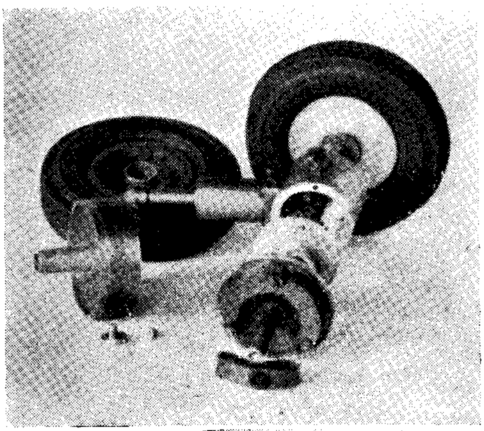
The chassis side members are ½ in. × ¼ in. dural bar, 12 in. long, parallel aft and tapering from the middle forward. It was my intention to mill out these side members to a channel-section, but instead of following the dictum of a famous American designer to "add more lightness," I have found it desirable, within reason, to retain weight, as the chassis complete with E.D. engine and ready to run weighs a mere 3 lb. Cross members of 3/32 in. sheet-dural are fitted fore and aft to the lower edge of the side members, secured by 5-B.A. bolts in tapped holes, the rear cross member being extended to form the after bridle attachment point, while the front one carries the pivot for the front axle. The front axle is a steel tube with stub axles pressed in to carry the wheels and pinned to the pivot on the front cross member, the whole axle swinging to effect steering for various diameters of track. Engine plates are of dural sheet secured to the upper edge of the side members by 5-B.A. bolts. The rear axle runs in ¾ in. o.d. by ¼ in. bore ball-bearings located in housings formed by fixing short lengths of ½-in. × ¼-in. dural on the top edge of the side members and boring out on the joint line.

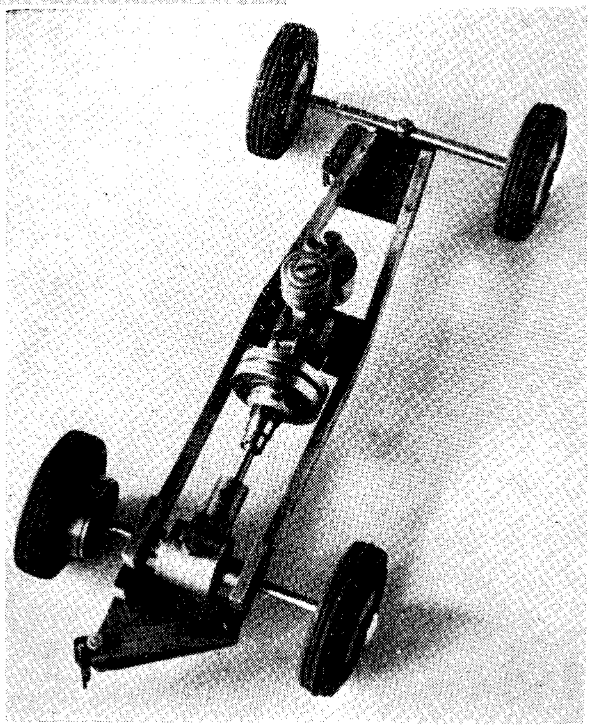
Effective in Operation

The rear axle assembly consists of a ¼-in. silver-steel shaft running in the ball-races already mentioned, 1.75 : 1 bevel gears and a centrifugal clutch incorporated in the near-side rear wheel. The bevels are totally enclosed in a casing turned from the solid, the only novel feature being the fact that the end cover is screwed into the casing and retained by one 7 B.A. security bolt. All bearings are of phosphor-bronze. A backplate is secured to the near side of the axle shaft and carries three pivoted clutch shoes of bronze with plugs of friction



The test chassis shown with E.D. Mk. II engine installed, exhaust stubs removed. Note clutch on rear nearside wheel





material, turned from cycle brake blocks, pressed into holes. In spite of the very small friction surface the clutch is most effective in operation. No springs are fitted, but the shoes have been fitted to make use of the servo action. The wheels are E.D. " Speedicords " of 3 in. o.d. on E.D. wheels, that on the driving side having had its inside disc replaced by a phosphor-bronze drum which encloses the clutch shoes mentioned above.

No Plagiarism

Lest I be accused of plagiarism in respect of the design of the clutch and its location in the rear wheel, let me hasten to add that this was running on the track in January, 1948.

Bodywork, when worn, is early-type " Shelsley Special " ; but a radiator cowl and tail fairing of twin cam Austin shape have been beaten from aluminium sheet and will be fitted in due course although I have a hankering for a working scale model of the Cooper " 500 " at the moment so other things must wait !

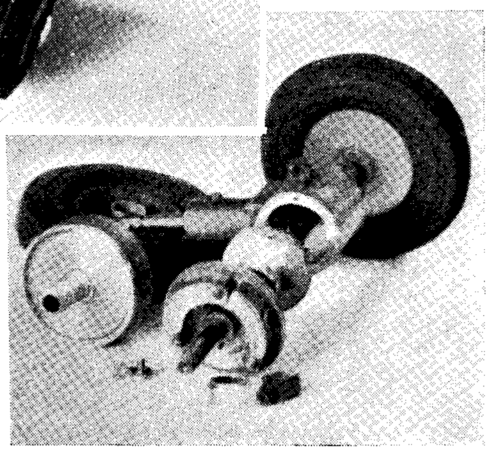
Performance

As to performance, I can give figures only for the ¼ mile, with a 2 c.c. E.D. supplying the urge. On a good surface, using a 50/50 mixture of " Redex " and ether, the chassis clocked a speed of 38 m.p.h. All the other running, and it has travelled many miles to date, has been done on a very short tether on a very rough wood block floor which, however, has proved that the chassis will take an unfair amount of hammering. The only weakness so far apparent is a tendency to bend front axles, but as the car is due to receive an i.f.s. system like the Cooper's, that is of no great moment.

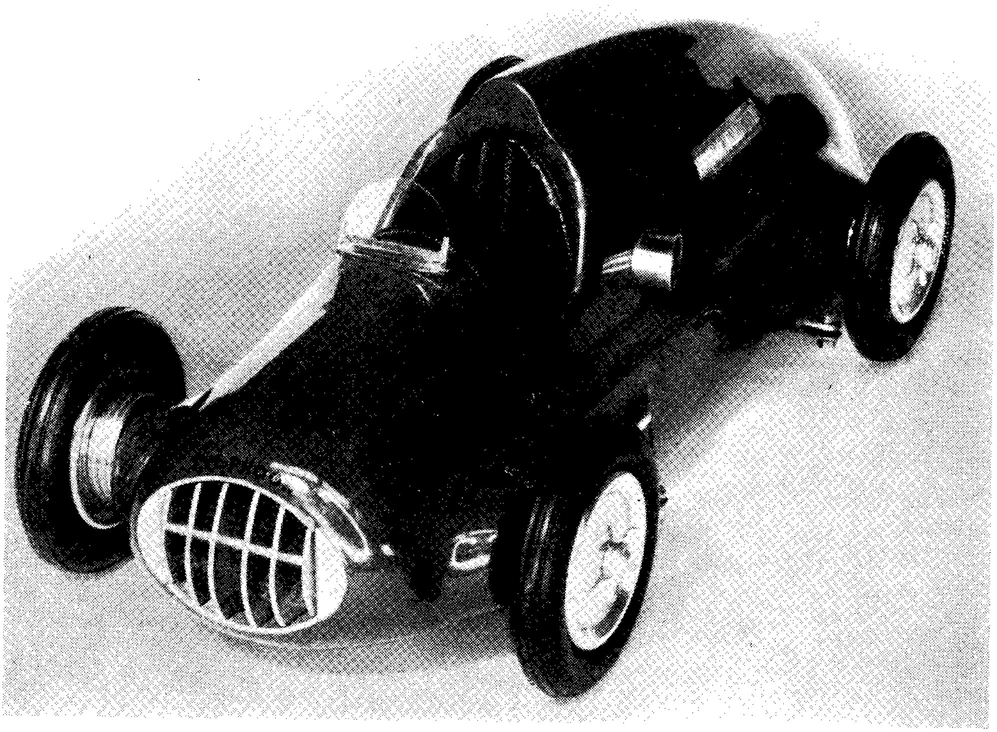
Experimenting

The chassis having been created for the purpose of experimenting with engines, ignition systems and fuels, I now find myself confronted with the problems that beset the full-size car designer ; road (or should I say track ?) holding, tyre sizes and gear ratios, fuels and the whole gamut of " designers' headaches." However, it is great fun, and my real problem now is, " Shall I make a scale working model Cooper to run in the 2.5 c.c. class or shall I go all out to produce a true ' Handel Special ' in the hope that I can eventually see a car of my own doing that ' magic century ' ? "

[We shall be glad to hear how other builders tackle this problem of testing, before fixing the engine in the chassis.—Ed., " M.E."]



"TYE-PHOON" by G. E. W. Tye



I HOPE that the following description of my car "Tye-Phoon" will encourage some newcomers to the model car movement to build a car for themselves. Let me say right away that the body and chassis were constructed on the "kitchen table" and that when I started I had no intention of constructing a car for THE MODEL ENGINEER Exhibition. It was only when nearing completion that I decided to exhibit it.

As a novice myself, but having been an interested reader of *The Model Car News* for some considerable time, I thought it advisable to follow some firm design, and then decided that the "M.C.N." Special would suit my purpose. My first job was to scale down the original drawing to fall into line with the four "1066" wheels used, and, not liking the "built-in" chassis, I constructed mine separately. Then came the question of what engine should be used. Not having the facilities for producing one myself, but being very much taken with the general design of the "Reeves," this was decided upon to be the power unit.

Now having made up my mind as to what I wanted (and I realised that in speed I could not compete with the "Dons"), I set about the construction of the chassis. This is of the sub-chassis type, the main members being fabricated from U-section dural. A drip pan of sheet aluminium is bolted to the lower flange and extends from the front cross member to the sub-chassis anchorage. Behind this is a flat floor accommodating the accumulator, coil and condenser, the switch being bolted to the side member. A booster socket is also provided, wired in parallel to the accumulator, to allow for charging without it being removed. Springing of both axles is by coil springs housed in the U-section cross members, and the drive is taken to the front wheels through a "1066" clutch and axle casing, 2 to 1 bevel gears being used. By the removal of two screws and two nuts and bolts the sub-chassis, complete with power unit and drive, can be detached.

The whole layout gives a clean, rectangular chassis on to which the body can be placed, held firmly in position by a spring clip on each side. These pass under plates projecting from each side of the main chassis members.

The two-volt accumulator has plates cut from those of a small multi-plate six-volt accumulator, the interior being packed with glass wool.

The balsa wood body is built up of approximately 150 pieces, built on to three-ply formers, the last 3 in. of the tail being worked out of a

(*Continued on next page*)

Here and There

by "Clubhound"

THE temperature has been rising steadily lately in the circles which seem more or less divided for and against the inclusion of American and British cars and engines in club and national competitions, where such competitions have in the past fostered the running of these types one against the other, or on even terms as the case may be.

Well, far be it from me to make any comment here, but it will be interesting to see which way the cat jumps and controversial comments from readers should be most interesting.

The Edmonton Model Race Car Club's recent annual dinner and dance at the Angel Hotel, Edmonton was an unqualified success. The line-up of model cars down the head table at the dinner attracted a number of highly favourable comments and lent an atmosphere of suitable character to the proceedings. And, incidentally, there were no drips on the tablecloth.

Speakers were Messrs. Wolfinger, the club's president, for the club; C. M. Catchpole, Secretary of the Surrey Model Racing Car Club, in response; R. F. Peers, Editor of *Mechanics* for the ladies, Mrs. C. M. Catchpole in response, and, G. W. Arthur-Brand, Associate Editor, THE MODEL ENGINEER for the chairman, E. J. Pickard, who responded. Following the speeches was the annual presentation of trophies, and a jolly fine collection they were too.

It looks as though Sweden is bent on holding a bumper exhibition next month and all model car enthusiasts will be pleased to hear that, among the many British exhibits which will appear are Messrs. Weaver and Harvey's excellent E.R.A.s. These two cars will be remembered by all who visited last year's "M.E." Exhibition and it will be recalled that Harvey's twin-cylinder 10 c.c. inline scale job captured the "M.C.N." award.

A number of enthusiasts are reported to be building the new "M.C.N." Grand Prix Special and the photograph which appeared in last week's issue is sure evidence of the handsome appearance it presents, even as a 2.5 c.c. version.

The 1950 racing season is getting very near now and the tang of hot fuels and castor will soon be hanging in the air around the various tracks up and down the country.

Scale enthusiasts have a new subject in the B.R.M. which, by the way, should be quite an easy job to tackle and should go places with its low frontal area. There have been hints from several clubs that this new G.P. car is being modelled.

At the annual general meeting of the Pioneer Model Racing Car Club which took place at the Royal Horticultural Hall on January 28th, the following committee members were elected for 1950:—

Messrs. J. Gascoigne, F. C. Hird, R. H. Curwen, K. Nicholson, A. Capon, J. W. Sullivan, A. N. Thorneycroft, and B. P. Winter.

An interesting and progressive change in the running regulations, No. 5, was that "all models must bear a strong resemblance to full-size British or Continental cars."

Messrs. J. Cruikshank and R. H. Curwen were elected life members, and Mr. J. W. Sullivan was elected to represent the P.M.R.C.C. at M.C.A. meetings; he is also the club's honorary press secretary.

Birmingham Model Car Club held its first annual dinner on February 2nd at the Chappel Tavern, Great Charles Street, Birmingham. Discussional meetings are held at the same venue on alternate Thursday evenings, and all visitors are welcomed.

They hope shortly to commence construction of an 84 ft. diameter track at Kingstanding, and plans have been prepared for a further one of 42 ft. diameter, inside this, at a later date. Further details may be obtained from the Hon. Secretary, D. J. Bracey, whose address is Flat 2, 128, Gough Road, Edgbaston, Birmingham, 15.

By the way, we hear that some industrious type is well on the way to producing a 10 c.c. four-cylinder twin overhead camshaft motor. We wonder who this can be?

"*TYE-PHOON*"

(*Continued from previous page*)

block. The radiator grille is fabricated from $\frac{1}{16}$-in. sheet aluminium and bolted through another balsa wood block to the front former. After the building up, and glass-papering down to shape was completed, slots were cut in the sides to allow the body to pass over the axles, tethering arms and switch spindle; then all cracks were filled with Alabastine before the first coat of paint was applied. Then followed further coats of paint, each being preceded by the necessary rubbing down, until a smooth finish was obtained: At this stage the windscreen (again, fabricated from aluminium sheet, tube and threaded brass rod), exhaust pipe, etc., were fitted and another coat of flat paint applied before the final rub down and coat of enamel. The seat squab was made separately and is removable to facilitate cooling when running.

My methods of production in some cases were unorthodox, but I found a great deal of pleasure in overcoming the little difficulties encountered through the lack of workshop facilities. Some hard work was done by my small drill fitted into the vice when the carden shaft and switch spindle, etc., had to be "turned"!

MODEL · CAR · ASSOCIATION

Programme for 1950

April 9th—Eaton Bray (M.G. Trophy).
April 10th—Chiltern Open.
May 21st—Bolton Open.
May 28th—Eaton Bray (Austin Trophy).
May 29th—Sunderland Open.
May 29th—Chiltern Open.
June 4th—Ossett Open.
June 18th—Eaton Bray (Drysdale).
June 18th—Dundee Open.
June 25th—Derby Open and Percival Marshall Trophy.
July 2nd—Bradford Open.
July 16th—Eaton Bray (Russell).
July 23rd—Bolton Open.
Aug. 7th—Harrogate Open.
Aug. 27th—Cleethorpes Open.
Sept. 3rd—Regional Trials.
Sept. 17th—Worcester (National Finals).
Sept. 17th—National Speed Trophy finals at Worcester.
Sept. 24th—Eaton Bray (Jaguar).

(The Regional events, comprising elimination runs for *The Model Car News* National Speed Trophy, will take place as follows: N.E., Harrogate; N.W., Bolton; Midland, Derby; South, Eaton Bray.)

The Meteor Club will hold their annual big event in November; the date, however, has not yet been fixed and will be announced at a later date.

The Percival Marshall Memorial Trophy will be competed for at Derby on June 25th, so come along all you scale fans and home builders; let us see what you can pull out of the box this year!

RECORDS CONFIRMED UP TO DECEMBER 31ST, 1949

	British				Open			
				m.p.h.				m.p.h.
2½ c.c.	¼ mile	F. G. Buck	Meteor	62.5	¼ mile	F. G. Buck	Meteor	62.5
	½ mile	F. G. Buck	Meteor	62.07	½ mile	F. G. Buck	Meteor	62.07
	1 mile	F. G. Buck	Meteor	61.23	1 mile	F. G. Buck	Meteor	61.23
	5 miles	—		—	5 miles	—		—
	10 miles	—		—	10 miles	—		—
5 c.c.	¼ mile	J. T. Green	Sunderland	80.36	¼ mile	R. W. Flower	B.M.C.C.	81.83
	½ mile	—		—	½ mile	R. W. Flower	B.M.C.C.	77.8
	1 mile	—		—	1 mile	—		—
	5 miles	—		—	5 miles	—		—
	10 miles	—		—	10 miles	—		—
10 c.c.	¼ mile	F. G. Buck	Meteor	109.87	¼ mile	W. S. Warne	B.M.C.C.	113.9
	½ mile	F. G. Buck	Meteor	107.83	½ mile	W. S. Warne	B.M.C.C.	111.1
	1 mile	F. G. Buck	Meteor	105.5	1 mile	F. G. Buck	Meteor	105.5
	5 miles	I. W. Moore	Derby	69.77	5 miles	—		—
	10 miles	—		—	10 miles	P. Hugo	Derby	57.15

For the Bookshelf

Modern Motorcars, by Gregor Grant. Temple Press Limited, Bowling Green Lane, London, E.C.1. Price 8s. 6d.

Several books have appeared recently dealing with automobiles of all shapes, types and sizes; it is doubtful, however, whether any have been able to achieve in a single volume what Gregor Grant has expressed, so admirably, in *Modern Motorcars.*

Profusely illustrated by over sixty excellent photographs of every conceivable type of modern car, from the sports and limousines of all nations to the latest Grand Prix racers, plus a vast quantity of line drawings and a frontispiece in multicolour, the book covers all branches of motors and motoring and should provide a wealth of knowledge and entertaining reading. It will undoubtedly find its way on to the bookshelves of all amateur motoring enthusiasts.

Novices' Corner

Tool Stands and Racks

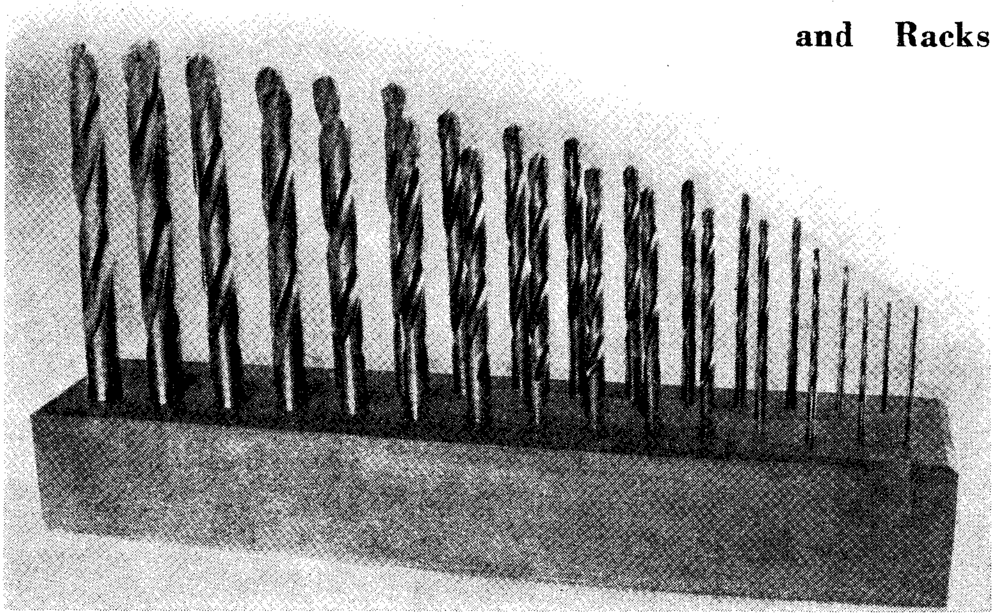


Fig. 1. A stand holding drills from $\frac{1}{16}$ in. to $\frac{1}{2}$ in.

SOME orderly arrangement of the small tools is almost essential in the workshop, both to enable any particular tool to be found without delay and to protect the tools themselves from damage.

It may waste time, if, say, a drill has to be picked out from a box full of such tools, and moreover, a set of reamers, for example, will almost certainly suffer damage to their delicate cutting edges if allowed to clink together in a drawer.

A familiar example of a tool stand is the ordinary commercial drill stand, in which the drills are arranged in one or more ranks according to size. This principle may be applied in the workshop not only to sets of drills, but also to other small tools of similar type ; furthermore, there is no need to go to the expense of buying tool stands, for, as will be shown, these can readily be made in the workshop to hold small tools of all kinds, and, at the same time, the stands can be made to fit into the storage space available.

For making these stands, oak and beech are, perhaps, the most suitable materials, and if the wood is obtained in the form of planed quartering, that is to say in lengths having a square cross section, much of the work will already have been done and the finished stands will have a uniform appearance. There is, of course, no need for the wood to be of exactly square section, and any form of material will be found suitable, provided that it is deep enough to support the tools and wide enough to give stability.

Before cutting the wood to length, a dimensioned sketch should be made showing the positions of the various tools, and if this is done in a methodical manner the work as a whole will be greatly simplified.

The stand illustrated in Fig. 1 holds a set of drills of from $\frac{1}{16}$ in. to $\frac{1}{2}$ in. diameter, advancing by 1/64 in. It should be observed that the front row starts with the $\frac{1}{2}$ in. and ends with the $\frac{1}{16}$ in. drill, so that these drills decrease in size by 1/32 in. from drill to drill, whereas the drills in the rear rank all represent 1/64 in. sizes. To make for easy handling and selection, the two rows of drills are staggered. For the sake of appearance, it is preferable to make the intervening distances between the drills in each row approximately equal, rather than to mount the drills with their centres equidistant.

To put this into effect, the centre distances between the drills are made to decrease by 1/32 in. in passing from the larger to the smaller sizes. The upper surface of the stand is marked-out by first drawing two parallel lines to denote the two ranks of drills, as shown in Fig. 2. If the wood used is, for example, $2\frac{1}{2}$ in. wide, these

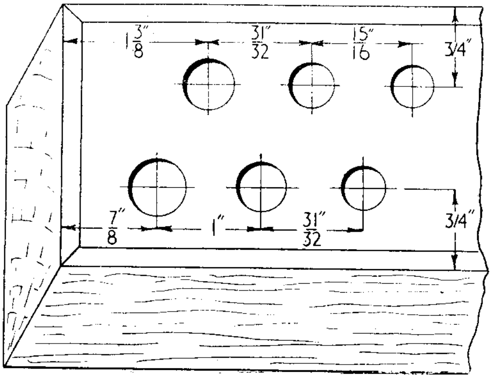


Fig. 2

two lines will be correctly placed when drawn $\frac{3}{4}$ in. from either edge of the stand. Starting at the left-hand end of the front line, make a light centre-punch mark to denote the position of the first drill, say, $\frac{7}{8}$ in. from the end of the block. The next drill in the front rank will be the 15/32 in. drill, and its centre may be marked-out with the dividers and centre-punch 1 in. from the first mark.

From now onwards, the dividers are set 1/32 in. closer for marking-out each successive centre, and the last centre distance in the front row will, therefore, measure 19/32 in. This constant decrease of the distance between the drill centres gives the correct appearance, whereas a centre distance of 1 in. maintained throughout would look unsightly.

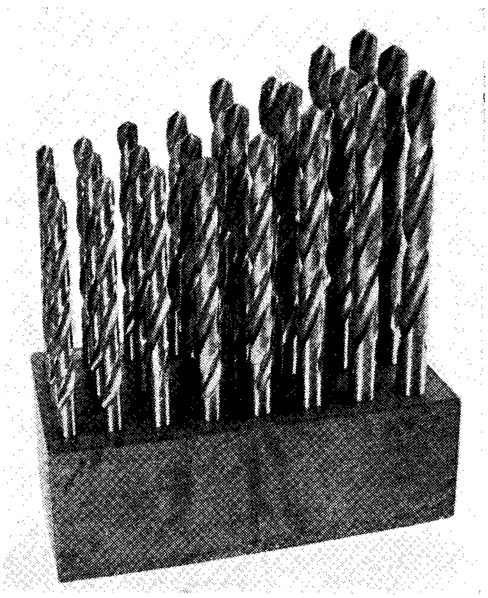


Fig. 3. *A set of letter-size drills mounted in a compact stand*

The centre of the first drill in the rear rank, that is to say the 31/64 in. drill, is marked-out half-way between the first two drills of the front rank. Again, the dividers are reset 1/32 in. closer for marking each of the remaining holes, and in this way the rear rank drills will be located midway between those in the front row. The block is marked-out to length with the aid of a square placed $\frac{3}{4}$ in. beyond the last drill centre in the front row. To ensure that the drills stand upright in orderly rows, the holes should be drilled in the drilling machine, using ordinary twist drills ; but if the machine will not hold the larger sizes of drills, the drill must be mounted

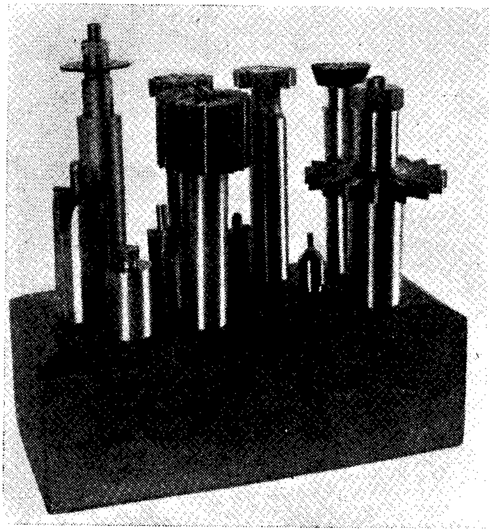


Fig. 4. *A stand holding a group of cutters*

in the lathe chuck and a tailstock drilling pad used to support the work. Where possible, the centre-punch mark denoting the drilling centre should be enlarged with a centre drill to the full diameter ; this will not only form a guide for the drill point, but will also prevent the edges of the hole being roughened and torn by the drill itself. In addition, when the larger holes are being drilled, it is advisable first to enter one or more pilot drills in order to bring the hole nearly to the finished size ; in this way, too, a cleaner hole will be formed and the point of the drill will not be so easily deflected by the grain of the wood. The holes should be carried to a sufficient depth to give the drills a good bearing when mounted in place, and, at the same time, the depth should be regulated so that the drill points lie approximately on an evenly sloping line, such as will be apparent in the photograph. To enable the drills to be readily removed from the stand, it is advisable to form the holes with a drill a size larger than the drill shank.

Metalworking tools will serve quite well for finishing the stand. It is cut to length with a

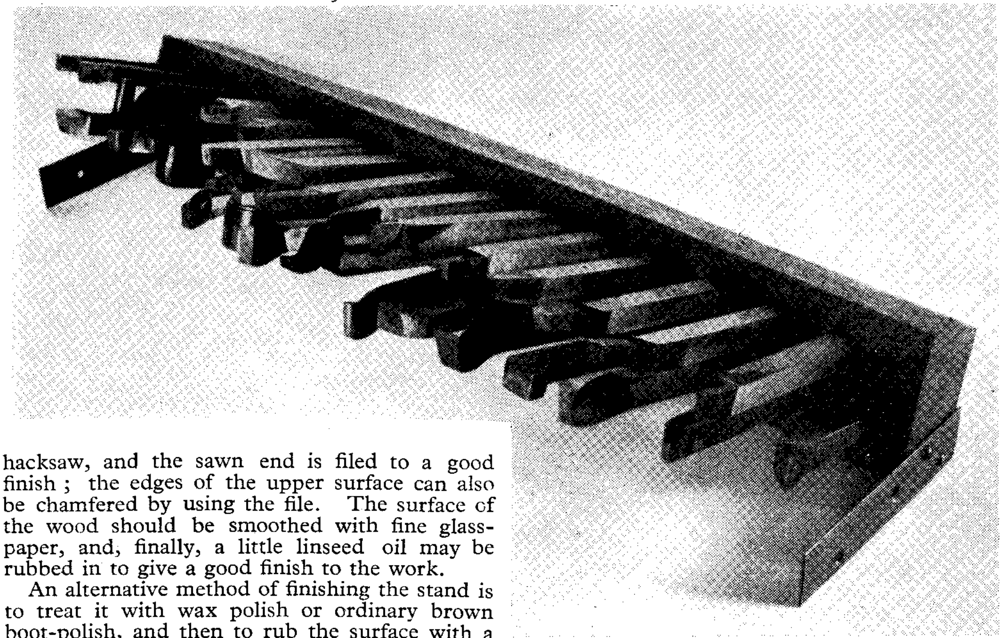


Fig. 5. *A lathe or shaping machine tool stand*

hacksaw, and the sawn end is filed to a good finish; the edges of the upper surface can also be chamfered by using the file. The surface of the wood should be smoothed with fine glass-paper, and, finally, a little linseed oil may be rubbed in to give a good finish to the work.

An alternative method of finishing the stand is to treat it with wax polish or ordinary brown boot-polish, and then to rub the surface with a brush. If desired, the sizes of the individual drills can be indicated by lightly stamping the stand with figure-punches; these marks will show up better if they are finally inked in with indian ink.

If a more compact form of stand is preferred, the pattern illustrated in Fig. 3 will be found useful as it accommodates a large number of drills in a very small space. This stand was made to hold a set of letter-size drills and, as there are twenty-five drills in the set, the arrangement adopted was to put the smallest four drills in the first file and three drills in each of the remaining seven files. As in the previous example, the centre distances in each rank decreased by 1/32 in. in passing from the larger to the smaller drills.

Other kinds of small tools can also be conveniently mounted in this way, and Fig. 4 illustrates a similar type of stand used to accommodate a group of cutters. The stand should be planned so that the tools are arranged in some form of order, and it is also advisable to leave room for additional cutters that may from time to time be added to the equipment.

It is a good rule to house the tools and accessories, required for use with any particular machine near at hand when this is possible; but the rack of tools belonging to a shaping machine was found to be too tall to fit into the drawer of the bench on which the machine was mounted. The stand was therefore made to lie in the inclined position by fitting a foot-piece at each end, as shown in the photograph in Fig. 5.

Lathe Chuck Keys and Spanners.

Those workers who prefer to operate the lathe while seated will find that it is a great convenience to have all the necessary chuck keys and spanners within easy reach. This can be readily arranged by housing these tools on the front of the bench as illustrated in Fig. 6. The keys are retained in a simple U-shaped fitting made from strip brass or steel, and the spanners need no more than two round-head wood screws to keep them in place. After a time, it will be found that the chuck key can be picked up and returned to its holder without even looking down, and, if this plan is adopted, there will never be any need to search for the key somewhere on the bench or among the chips in the lathe tray.

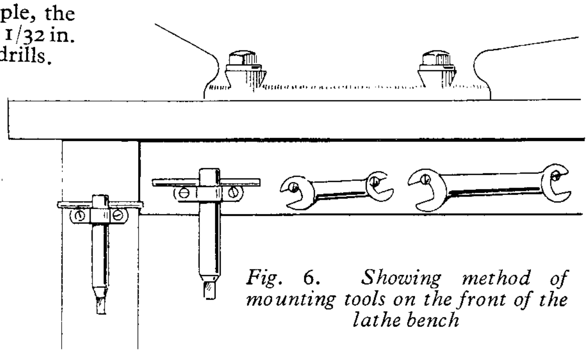


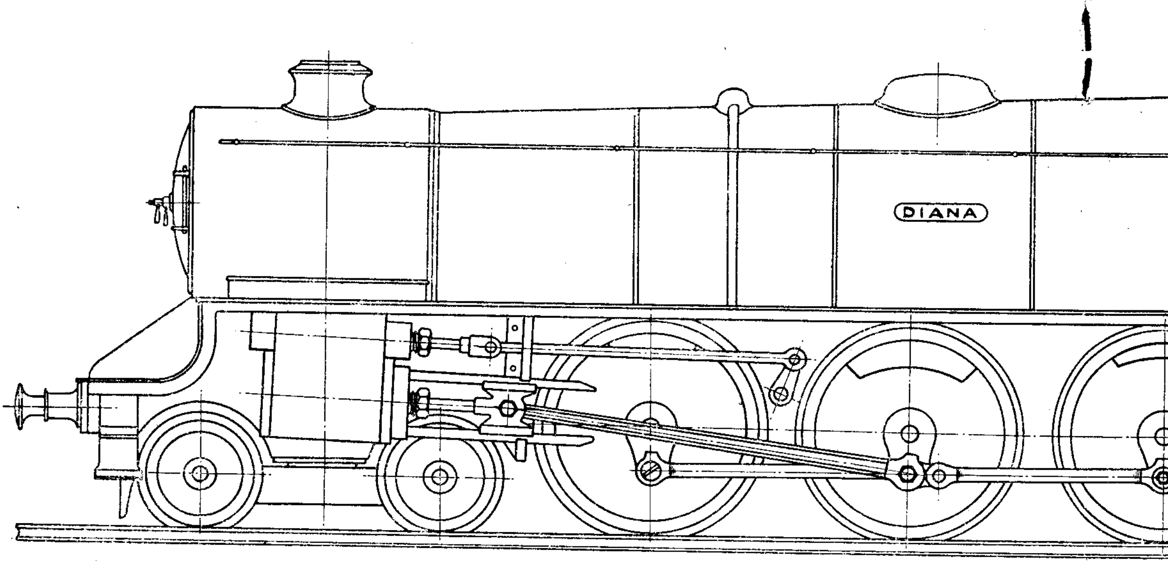
Fig. 6. Showing method of mounting tools on the front of the lathe bench

It will be noticed that towards the middle of the bench the tools are placed horizontally; this arrangement is intended to prevent spanners being dislodged when the operator takes his seat.

A Coal-Fired Version of the "Wee D

JUDGING from correspondence, the wee *Dot* had a favourable reception, more locomotive builders taking it up than I should have anticipated ; but it looks as though some other good folk beside your humble servant, are not very keen on "poison gas plants," and quite a number of requests have come to hand for a drawing and a few notes for a coal-fired boiler. This is where a little difficulty arises ; I can design the boiler all right, and followers of these notes should have no difficulty in building it, but what about firing it ? There is only a matter of $1\frac{5}{16}$ in. between frames ; by the time you have allowed for the thickness of the copper, and say a $\frac{1}{8}$ in. water space, we are down to a grate only $\frac{13}{16}$ in. wide, if the normal type of firebox is used. There would be no difficulty in firing this with charcoal only, but you'd be in the same boat with the firemen on the spam cans, never able to put the shovel down. Best quality Welsh coal would burn all right, but where are you going to get any ? The last lot of Welsh nuts delivered for our domestic boiler last year, very nearly sent me "nuts" in another sense of the term. Many years ago I built a gauge "1" Hughes type L.M.S. 4-6-4 tank engine for an old friend, who wanted it coal-fired, and I got over the very narrow grate difficulty by splaying out the side sheets of the firebox, and riveting them direct to the wrapper sheet, without using a foundation-ring. This permitted a grate just a shade over 1 in. wide, though the actual firebox was narrower above the grate. With a good hearty blast, the fire burnt well—the coal was ever so much better in those days—and the engine made plenty of steam. She would haul my weight continuously ; but the fire needed careful attention, more than it would be likely to get on the usual small railway.

Anyway, I thought things over, and came to the conclusion that the best way out of the trouble would be to follow the good example of the C.M.E. of British Railways, and go in for a wide firebox ; so I put a sheet of drawing paper on the board, and made a carbon tracing of the front end of *Dot*, leaving out the trailing wheels, cab, and boiler. Then I just indulged in one of my daydreams, which need no assistance from text-book, slide-rule, figures, formulae or anything else of a like nature ; although a cup of the enginemen's best friend is a very great help. Old readers of this journal may recall that by aid of a cup of tea and an aspirin, I designed the 4-12-2 "Caterpillar" goods engine, still going strong after some 24 years' service, without trouble of any kind. Well, my daydream materialised, as usual ; "out of the mist" arose the figure of *Diana*, and I added the necessary parts to the carbon tracing, with the result that you see in the accompanying illustration. Don't be surprised if, in due course, a similar type of locomotive in full size, makes an appearance on British Railways ; not, of course, with a simple loose eccentric valve-gear, but with the usual Walschaerts, or maybe a unit-construction Baker gear.



Coal-fired version of Gauge "1" "Dot." (*A future B.R. standard*

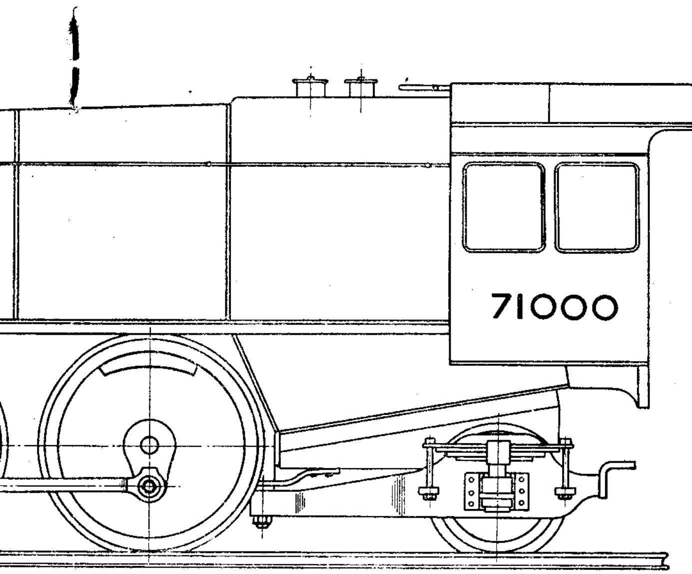
This Comparison isn't Odious !

The coupled wheelbase of *Dot* is unequally divided, and fairly long, like most engines of the

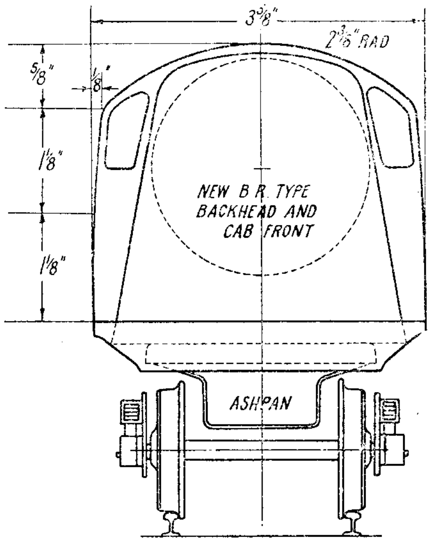
ee Dot Like Doris" by "L.B.S.C."

4-6-0 type ; and visualising her as a 4-6-2 with the same coupled wheel spacing, she looked like a Jerry poodle. I therefore set the trailing coupled wheels a little more forward, so that between leading and driving, and driving and trailing, the spacing became equal ; this shortens the engine without altering the working parts in the least. To enable a 4-6-2 to get around the same curves as a 4-6-0, the pony truck needs plenty of side movement, so I abolished the trailing cradle altogether, and substituted a simpler arrangement. is all we builders need worry about !

In place of the weeny grate area of the 4-6-0, we have a grate approximately 2$\frac{5}{8}$ in. long and 2$\frac{1}{4}$ in. wide, not much smaller than *Ayesha's* ; and with a combustion-chamber in the barrel, there won't be any difficulty in keeping steam up. In fact, if you like, you can enlarge the cylinders to $\frac{5}{8}$ in. bore, or even larger than that, if the castings will stand it ; and the engine won't over-exert herself with a load of, say, two hefty adults or four children. Slightly different from the



e B.R. standard type ?)



Part cross section

The king pin of the pony truck is attached to the bottom of the ashpan by a bracket, and the top of it projects above the bracket and fits into a hole in the cross member or brace at the end of the main frames. The cross stay at the rear of the pony truck is arranged to connect up to the drawbar on the tender, so that the pull is taken through the pony truck frames ; and this has the added advantage that the pull is almost central with the rails, whereas with the usual arrangement of drawbar, pulling from the drag-beam, the pull is right over to one side, when the engine is on a fairly sharp curve. This is due to the overhang of a long engine ; and with a heavy load, tends to cause derailment of the tender. There is no drag-beam at all ; merely a sill under the cab floor, the cab being attached to the boiler, which will be standard B.R. practice. Another advantage is that when the grate-dumping pin is pulled out, the trailing truck comes away with the ashpan, leaving the firebox perfectly unobstructed. Pulling through the pony truck is "all wrong," according to the book, but it works O.K. on this size of locomotive, and that gauge "1" toy locomotives that came over from Nuremberg in the days before the Kaiser's war !

If you take a look at the back view, which is partly cross-section, you will see that the boiler backhead, and the cab front, are what will be standard B.R. patterns, so builders of *Diana* will have a B.R. type engine on the road, long before the first big sister leaves the shops. We could put in the new regulator as well, with its side handle, and rod outside the boiler, but it would be rather too fiddling on such a small engine. A coal-fired boiler should have a regular feed, and not rely on the hand pump in the tender ; so I will give details of a suitable pump, all being well, along with the drawing of the boiler. Alternatively, one of my weeny injectors, with specially small cones, could be fitted alongside the firebox (another B.R. standard-to-be). Forgive my smiling as I write that ; a very short while ago, the idea of feeding a coal-fired gauge "1" live passenger-hauling engine with an injector, would have been ridiculed as the product of a crazy brain. We live and learn !

Variation for "Atlantic" Type

Anybody whose curves are too sharp to admit of a "Pacific" type engine running around them, can shorten this locomotive into an "Atlantic" without interfering in the slightest with the working parts. Simply cut the frames off at $1\frac{1}{4}$ in. behind the driving axle, and shape them, as shown by dotted lines, and fit the cross stay, also the pony truck, exactly as described below for *Diana*. You then have a 4-4-2 chassis, with a fixed wheelbase of only $2\frac{5}{8}$ in., and that should very nearly run around the edge of a dinner-plate. The firebox will be exactly the same size as for the 4-6-2, but the combustion-chamber will be omitted, the tubes and superheater flue running from the smokebox tubeplate, through the shortened barrel, to the front plate of the firebox. The cab will be exactly as shown, and a similar tender can be used.

4-6-0- to 4-6-2

Here are a few details for altering *Dot* to *Diana*. Anybody who has already built the 4-6-0 and wants to convert it to 4-6-2, may, if they so desire, keep to the original wheelbase, and merely add the trailing truck, and lengthen the boiler to suit the 4-6-0 coupled wheelbase. Those who are starting from scratch, and others who don't object to a little extra trouble, can finish off the rear end of the frame assembly as shown in the accompanying illustrations. Cut the frames off short, $1\frac{1}{4}$ in. behind the centre-line of the trailing axlebox opening, and snip the corners diagonally as shown. Cut a piece of $\frac{1}{2}$-in. by $\frac{1}{4}$-in. brass bar to a little over $1\frac{5}{16}$ in. in length, then square off both ends in the chuck, exactly to that measurement. Drill three No. 41 holes at the bottom of the frame, in the places shown, and fix the cross member by aid of 3/32-in. or 7-B.A. countersunk screws. Exactly in the middle, on the underside, drill a No. 30 hole halfway through; that is, to a depth of $\frac{1}{4}$ in.; see that the drill goes in square with the bottom. This is to accommodate the extension of the king-pin, and allows the pull to be transmitted through the pony truck instead of the boiler.

Pony Truck

It is quite possible that castings will be supplied for this, with dummy axleboxes and springs cast on. A separate casting, one right hand and one left, would be needed for each side; alternatively, the whole pony truck, including pivot block, cross stay and drag-bar, could be in one piece, and have separate dummy springs and axleboxes attached. For built-up construction, two pieces of 16-gauge steel will be needed, same stuff as used for main frames, each $3\frac{7}{8}$ in. long and $\frac{7}{8}$ in. wide. Cut these out together, same as main frames; drill the holes for screws and axle, then bend to shape shown in the illustration. The narrow ends are screwed to a $\frac{1}{2}$ in. length of $\frac{1}{4}$ in. square brass rod, faced off truly at each end; a simple chuck job. I have shown two screws, for neatness sake, but a single large screw, say $\frac{1}{8}$ in. or 5 B.A., would do equally well at each end. Drill a No. 30 hole in the middle for the king-pin.

A cross stay is needed, not so much to stiffen the little triangular frame, but to take the weight (or rather its share of the weight) of the trailing end via a flat spring attached to the underside of the ashpan. This will be shown in the detail drawing of that component, along with the description of the boiler. The stay is just a strip of 16-gauge steel, $\frac{3}{8}$ in. wide, bent up at an angle each side, to fit between the frames of the pony truck; see plan view. If you hold the strip of metal against the bottom of the frames, at the correct location, and scratch a line across the ends, holding the scriber point against the inside of the pony frame, it will show exactly where to make the bends. Alternatively, the strip need not be bent at all; personally, I should cut the ends off to the same angle as frames, jam in position, and give each side a spot of my old friend Sifbronze. Brazing or silver-soldering would do equally well. Set the stay level with bottom edge of frames. Don't fix it permanently until the wheels and axle have been fitted; see below.

The combined stay and drag-bar which connects the back ends of the pony frames, is made from a piece of 16-gauge steel $\frac{3}{4}$ in. wide, and approximately $2\frac{7}{8}$ in. long. First bend it to the shape of an angle with a slight radius instead of a sharp bend (see elevation view), an easy job in the bench vice. Tip for beginners: set it in the bench vice with half the width projecting; hold a bit of iron bar against the piece standing up above the vice jaws, and hit the bar with a fairly heavy hammer a few times. That will give it the K.O. in a matter of seconds, and the piece won't be marked, as the bit of bar distributes the force of the blow, the full length of the metal. I did most of my bending that way before I had the "Diacro" bender. Cut one of the angles to the shape shown, leaving a tag at each end a full $\frac{1}{4}$ in. long, which is bent backward at right-angles (see plan view) and attached to the end of the pony frame by a couple of $\frac{1}{16}$-in. rivets. The distance between frames should be $2\frac{5}{16}$ in.

Note—don't fix either stay permanently until the wheels and axle are ready for erection, or you won't get them in. The wheels and axle are made up similarly to the tender wheels and axles, the wheels being $1\frac{1}{4}$ in. diameter on tread, with flanges 3/32 in. deep, the hole in the middle being reamed 5/32 in. The axles are turned from $\frac{3}{16}$ in. round steel held in the three-jaw, wheel seat and journal being turned at the same setting. The cast dummy springs and axleboxes may be exactly the same as described for *Dot's* tender, and fitted in the same way, the holes for the journal being drilled through the hole in the pony frames, after the castings have been attached to them. The whole bag of tricks can then be assembled as shown in the plan view, and a No. 40 hole drilled in the drag-bar, to take the drawbar pin.

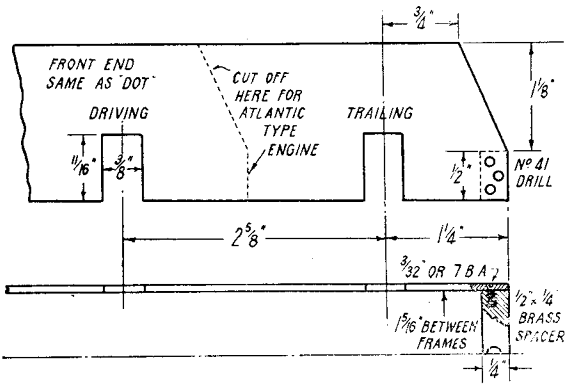
Cab

Anybody who completes the frame alterations, and makes up the pony truck, and is stuck for a job whilst I make the drawing of the boiler, can cut out the cab, The size and shape of the front, or weatherboard, is shown in the part cross-section of the trailing end of the engine. Don't cut the boiler opening until you have made the boiler; it is easy enough to fit the cab to the

boiler, but not so easy to fit the boiler to the cab! The sides are shown with the "tumble-home" that British Railways are adopting—similar to the "Schools" class on the old Southern—but the front is flat "for the sake of simplicity," with apologies to a famous catalogue. The window openings in the cab front, may also be left until the opening for the firebox wrapper is cut out. The inner edges follow the same contour.

The exact length of metal for the sides and top, which are all in one piece, can easily be obtained by running a bit of soft wire around the edge of the cab front, and straightening it out. When making a cab of this kind, I should make a paper pattern first—the dressmaker of childhood days taught better than she knew—as a dozen pieces of paper spoilt, wouldn't "break the bank," whereas you might make an apple-pie of your last bit of metal. Incidentally, 22-gauge sheet brass, or steel, would be just right; the *same thickness* used for the cabs of the Bulleid engines on the Southern, rather different to the $\frac{3}{16}$-in. steel plates used for the cabs of the old Brighton engines! The strip of metal should be $2\frac{5}{8}$ in. wide, to allow for the extended roof. The opening for the "sunshine roof," or sliding part, is $2\frac{1}{2}$ in. wide, and $1\frac{5}{8}$ in. long, a runner being fixed to each side, in which the removable part slides. This can be taken right off when running, and renders the "handles" and the firehole quite accessible. The lower part of the cab is 2 in. wide.

The sides of the cab are $2\frac{1}{4}$ in. high, half vertical, half canted, to match the front. The windows are very large—one of the desirable features stressed for the new cab. In this little engine they can be made $\frac{15}{16}$ in. high, and $\frac{13}{16}$ in. wide, and "glazed" with a strip of mica attached

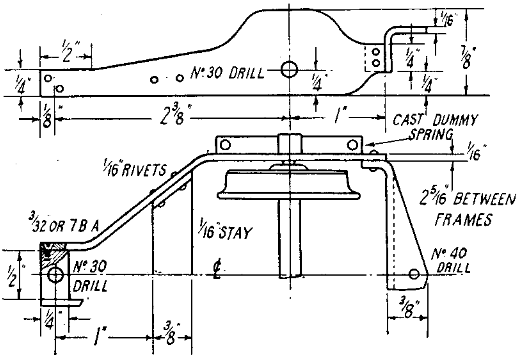


Rear end of main frames

to the inside, similar to the arrangement I have described for larger engines. The sill under the rear edge of the cab is made exactly the same as the drag-beam of *Dot*, except that no draw bar slot is needed, the draw bar being attached to the pony truck, as previously mentioned. The cab cannot, of course, be erected until the boiler is on; and I hope to describe the boiler in the concluding instalment about *Diana*.

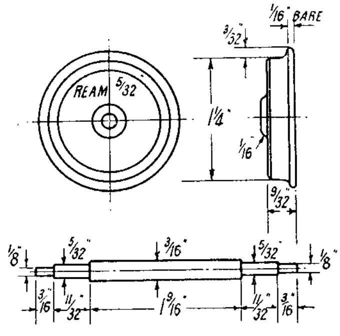
Generalities

The letters about cylinder steam passages have, up to time of writing, all been very interesting; and your humble servant is gratified to know



Pony truck

that the sizes given in my instructions are generally approved. The simple explanation of the whole business is that I reckon out the size of my steam ways, to pass "without let or hindrance," the amount of steam needed to do the job. Just that and no more. As all my engines do the maximum amount of work, on the minimum amount of steam, they don't require huge passages; but they *do* require big ports, so as to get the largest possible opening in the shortest space of time, and enable the small



Pony wheel and axle

amount of steam to get busy on the piston-head at the instant the crank has passed the centre. It may not be "text-book," but I submit it is "common-sense," and it certainly does the doings, which is all that matters.

My big ports have been derided, time and

(*Continued on page* 367)

*Miniature Slide and Strip Projectors

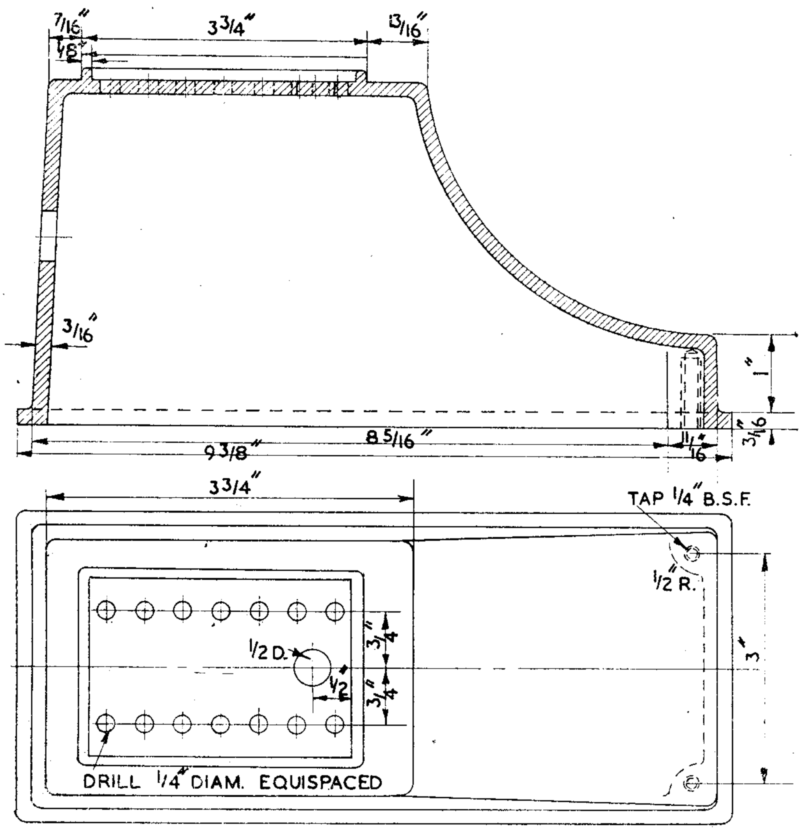
by "Kinemette"

As already mentioned, the main structural parts of the single-frame projector are made from castings, which greatly simplifies and expedites the work of construction, as very little machining is necessary, and that only of a plain and straightfoward nature. It is, however, possible to use fabricated components which conform to the essential requirements if so desired, though it may be desirable to modify their shape to facilitate the work of construction, whether by a process of bending and forming, or the joining together of more simply shaped pieces. In either case, it is recommended that some pains should be taken to preserve shapeliness of the complete structure and avoid the stark ugliness which often results from the attempt to over-simplify constructional processes.

Base Casting

This component serves as a pedestal to carry the lamphouse and optical system, and also as a housing for the transformer to supply the current for the low-voltage filament. In the event of direct-current supply mains being used, the transformer may be substituted by a resistance, either of the fixed or variable type, having a suitable resistance value and current capacity for the type of lamp used. This could, of course, be used also for a.c. mains supply, but the transformer is much more efficient and economical, besides avoiding the heat which is inevitably generated when it is necessary to dissipate a considerable wattage by means of a resistance.

Should the projector be operated by battery current, or a high-voltage lamp be used—either of which eliminates the need for a transformer or resistance—the space inside the base is redundant, and a much smaller and shallower base may be

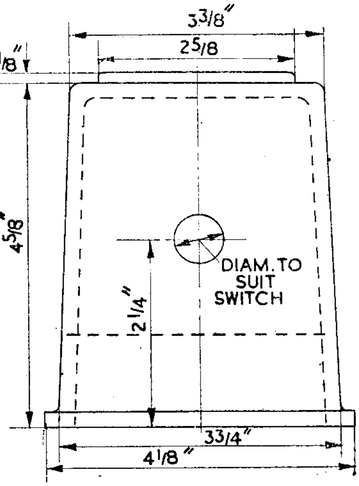


BASE CASTING - 1OFF - L. ALLOY

**Continued from page 262, "M.E.," March 2, 1950*

used, but some form of fairly massive plinth is desirable to give reasonable stability to the projector. While the complete instrument would be rendered much more compact, and possibly better-looking, by reducing the height of the base, it is preferable to have the current supply auxiliaries contained entirely in a single unit rather than to fit them as extras.

The casting is so designed that no machining is required except the drilling and tapping of holes, any necessary cleaning up being done by means of a file. In view of the clogging propensities of aluminium castings, the use of a " Dreadnought " or similar type of file is recommended. The rim on the underside should be trued so that the base will rest fairly on a flat surface, and similar treatment applied to the outer edges of the top surface, the ridge on which should fit inside the lower edge of the lamphouse and locate it in position. At the front of this surface a strip of ½ in. × ½ in. × ⅛ in. angle-section light alloy is attached by three 4-B.A. screws to hold the condenser housing in a vertical position ; this should not be fixed until the lamphouse has been fitted.



End view of base casting

On the underside of the base, holes are drilled and tapped to take the two rubber feet at the rear corners, and the adjusting screws at the front corners. The former are 4 B.A., to take countersunk steel screws ; standard rubber feet, or rubber bottle stoppers cut to about half length and drillled through the centre, may be used here. At the front, the holes are drilled and tapped ¼ in. B.S.F. and to the maximum depth permissible without breaking through the top surface, in order to give a good range of adjustment.

Other holes to be drilled in this casting include the ventilation holes on the top surface and a hole in the rear panel to take the switch. A standard toggle switch as used for radio sets is suitable if a transformer is used for supplying the lamp, as the amount of current to be controlled is very small, but a more robust form of switch would be necessary where a resistance is used, especially on direct current. The holes for fixing the transformer will depend on the design of the latter and the form of attachment provided. A suitable transformer, as used for the " M.E." home cine-projector, is available, and in this case angle brackets are provided, at the four corners, to enable it to be fixed to the underside of the top surface by four screws.

An undershield of sheet metal, attached to the rim of the base, is desirable, though not absolutely necessary. It may be held in place by about six 4-B.A. screws, and several fair-sized holes should be drilled in it to allow free access of air to the transformer, and thence upwards into the lamphouse, to provide ventilation by convection.

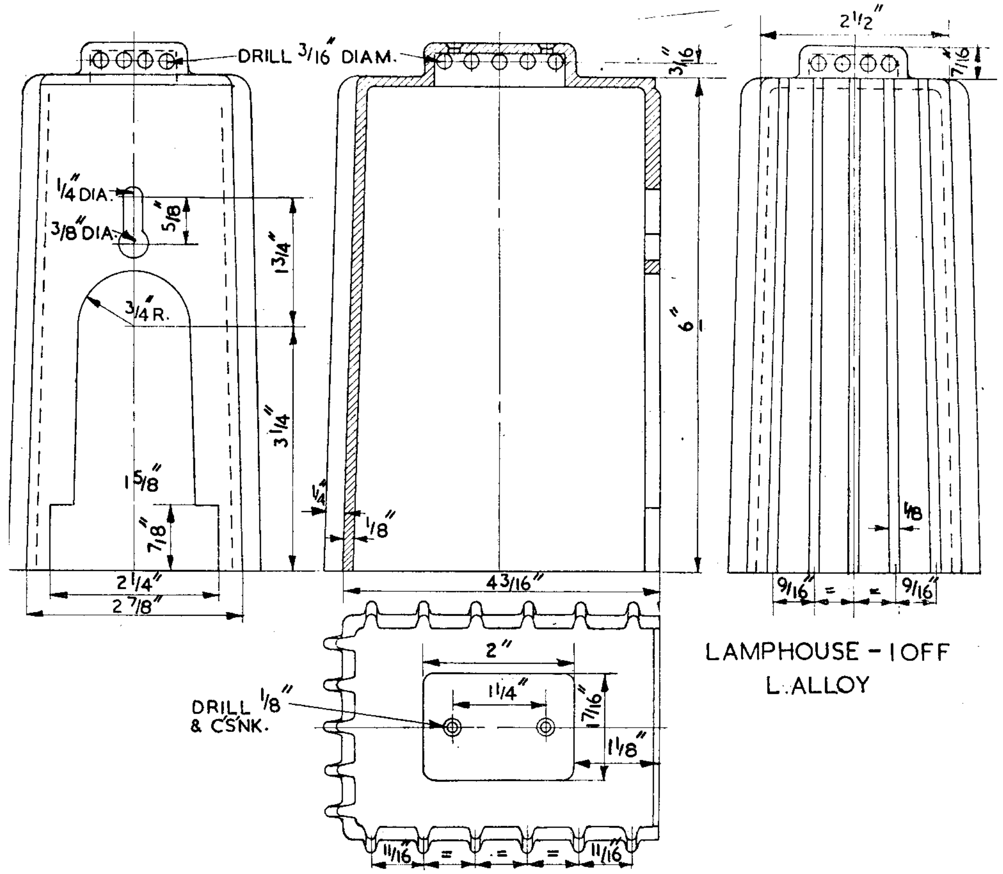
Lamphouse

The casting used here is identical with that of the " M.E." cine-projector, though its method of fitting is modified, necessitating slight alteration, which can be carried out by filing. Its lower edge should be trued up so as to rest fairly on a flat surface, and the front vertical face should then be filed or machined square. The latter operation can be carried out by mounting the casting on the cross-slide of the lathe, using a strap and two long bolts, and face-milling with a fly-cutter held in the lathe chuck, set to a sufficiently wide radius to sweep the entire surface. It will be found necessary to overhang the front edge of the casting from the side of the cross-slide, as the cutter would otherwise foul the slide at the bottom of its sweep ; but the operation can be carried out with ease in a 3½-in. gap bed lathe. The cross-slide is, of course, traversed to take a cut across the surface, the depth of cut being controlled by the saddle feed, and it is only necessary to remove sufficient metal to clean up the surface.

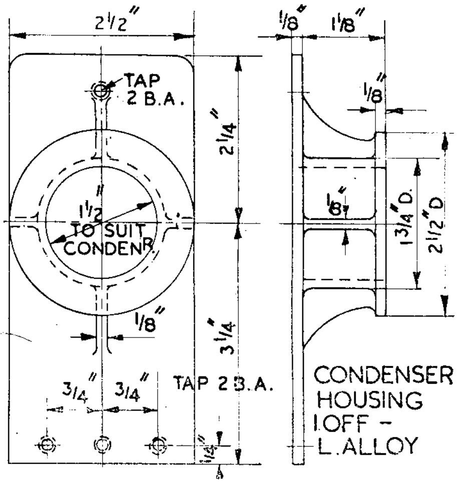
Holes are drilled around the clerestory head for ventilation, and two countersunk 4 - B.A. clearing holes drilled in the top surface for securing the light trap. The only other work on this casting is the cutting of the rebate in the lower part of the front (the main opening is cast in), and the " keyhole " which hooks over the screw in the vertical face of the condenser housing, to hold the two components in correct relative location, while enabling the lamphouse to be lifted off quite easily.

Condenser Housing

This casting also is the same as that of the " M.E." cine-projector, and the details of its machining will depend on the size and type of condenser used. The latter may be a complete mounted unit, containing two plano-convex lenses with the convex sides innermost and the flat faces outside ; such condensers are obtainable from optical component manufacturers, already fitted to brass tube mounts. In this case the housing is simply bored to take the condenser a snug push fit. Alternatively, separate lenses may be fitted direct to the housing, which in this case is machined with a a rim to locate the front lens, a short tube being used for a spacer, and the rear lens is then retained in place by a spring



LAMPHOUSE - 1 OFF
L. ALLOY



CONDENSER
HOUSING
1 OFF -
L. ALLOY

circlip in a groove machined in the housing. The lenses should not be a tight fit, either in the bore or endwise; a slight amount of play should be allowed to take care of possible expansion. A condenser of $1\frac{1}{2}$ in. diameter, as recommended for the "M.E." cine-projector, will cover the 35 mm. single-frame size.

To machine the housing, the flat rear face should first be clamped to the faceplate and the circular housing set to run as truly as possible, paying less attention to the circular flange, as it can be machined on the edge. The facing and boring can also be carried out at the same setting, after which the casting can be held over the front flange in the inverted jaws of the chuck, and the back surface faced.

The edges of the rectangular face are then trimmed by filing or machining, taking care to square the bottom edge with the sides, after which the angle piece already mentioned is attached flush with the bottom edge by three 4-B.A. screws.

With the lamphouse in position, and located by the ridge on the top surface of the base, the condenser housing is placed against it, making certain that it is in close contact with the front of the lamphouse, and the screw holes for securing the angle bracket to the base marked out and drilled. After fixing the housing in place, it may be found that some slight fitting work is required on the surface of the base or the under-

(*Continued on page* 363)

A Model Stationary Steam Plant

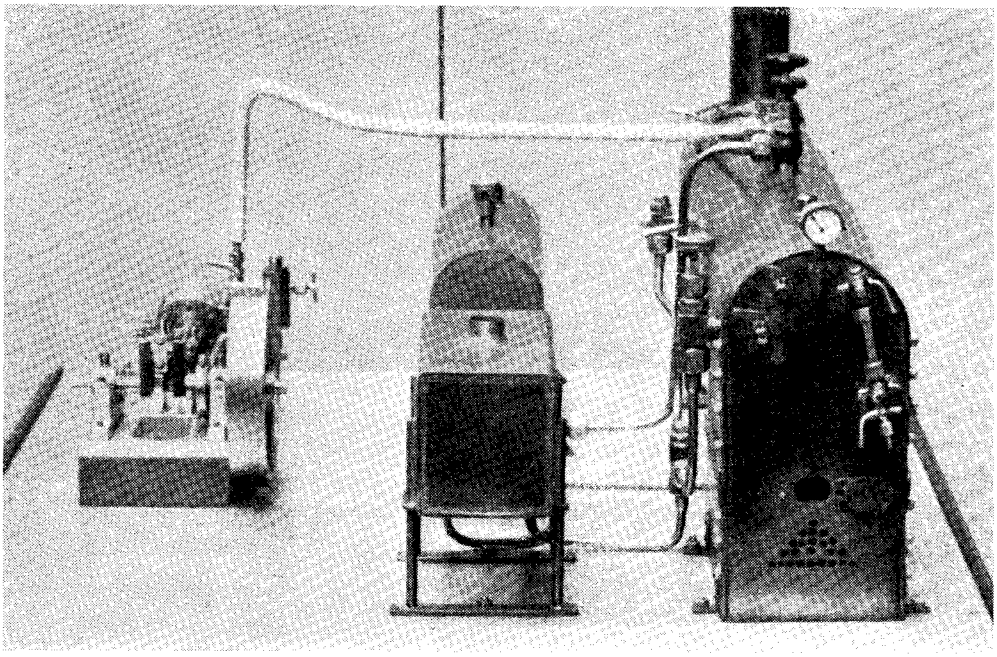
by P.H.C.P.

IT is hoped that the description of this model will be of interest to those younger members of our fraternity who are about to leave home and Dad's M.L.7 for their period of national service.

During his service the young man will find that the education branches will encourage and give all possible assistance with any form of hobby, from dress-making for the W.R.A.C., to the production of anything with the hands or brain for the more masculine types.

The model was constructed whilst on service in B.A.O.R. It is entirely of "freelance" design, made of bits and pieces and the only machine used in its construction, with the exception of the flywheel, was a $1\frac{3}{4}$-in. plain lathe.

It was originally intended to produce a $\frac{1}{2}$-in. scale locomotive and back numbers of THE MODEL ENGINEER were turned up for details; this accounts for the rather unusual stationary boiler. It was constructed to MODEL ENGINEER detail, but modifications were added later. All joints were silver-soldered by oxy-acetylene torch which proved quite successful until it came to the brass tube spirit burner. A hunt around various dumps had produced some "brass looking" material which was sawn into the required lengths, drilled, assembled and the torch brought into action—action it was; what that brass "looking" tube consisted of is now of no consequence, it ran like butter before a tropical sun and after two attempts, which cost a small fortune in silver solder, the tube idea was given up and a solid block of dural was sawn and filed until outside dimensions were equivalent to that of the assembled tubes. Holes were then drilled where the tubes should be, this giving excellent results as a burner; also it was found that the dural could easily be made spirit tight.



When the boiler was completed and steam tested the inevitable "change of station" came about. It was then realised that you may transport a locomotive, but the permanent-way is a different matter, so at the next station, it was decided to scrap the idea of a locomotive and produce a stationary steam plant, hence the boiler modifications.

It was now necessary to work out the size of cylinder which the boiler could supply with steam. An engine of $\frac{3}{4}$-in. bore and $1\frac{1}{2}$-in. stroke was found suitable, and work started on a full-size line diagram, being satisfied that the engine "looked" right both in elevation and plan. Each part was drawn twice full-size, no particular metal being stated in order to avoid future complications.

With the drawings completed, material for construction was considered and basically it

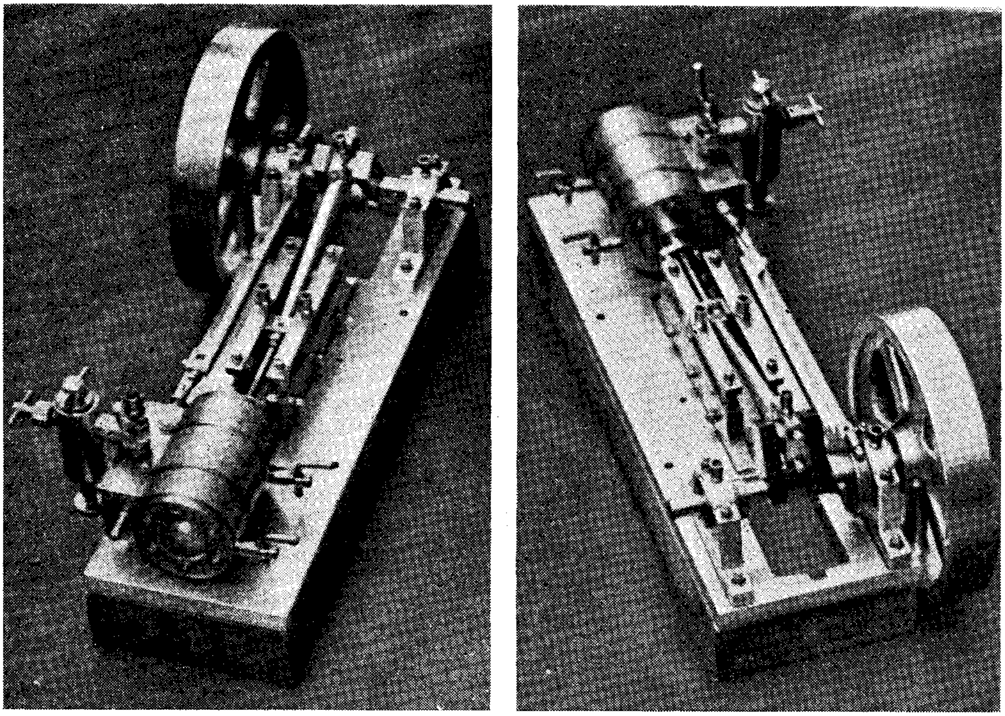
was found that three pieces were required, i.e., (1) a piece of 2-2$\frac{1}{4}$-in. round bronze for the cylinder. (2) a piece of $\frac{3}{8}$ in. thick plate (any metal) for the soleplate and (3) a piece of steel plate for the guide block, bars, crosshead and crank webs.

The bronze, 8-mm. steel plate and a piece of 10-mm. dural were collected from various places and the hacksaw put to work. It was then found that a vertical slide would greatly improve the capabilities of the 1$\frac{3}{4}$-in. lathe, so a friend who ran a workshop, and was also a keen modeller, was shown a sketch of what was required, also details of the flywheel, and asked if anything could be done. In the meantime the connecting and eccentric rods were cut from the dural plate, the steamchest from the bronze, and other parts which required plain turning were finished.

The vertical slide duly arrived and a commencement was made on the cylinder. Using the slide as a boring table the base was machined. Next came the machining of the flanges, which was done with the aid of a mandrel and turning between centres. The unwanted metal between the flanges was then cut away with saw and file, leaving sufficient metal on one side through which the steam passages could be drilled. The ports were cut using $\frac{1}{8}$-in. and $\frac{1}{4}$-in. end-mills.

The drilling of covers and glands was the next step, and was done by first drilling all holes tapping size, opening out to clearance size in the covers, etc., afterwards. This ensured accurate fitting of covers and glands over the studs. The steamchest and cover were fitted in the same way, all faces being hand scraped to a perfect fit.

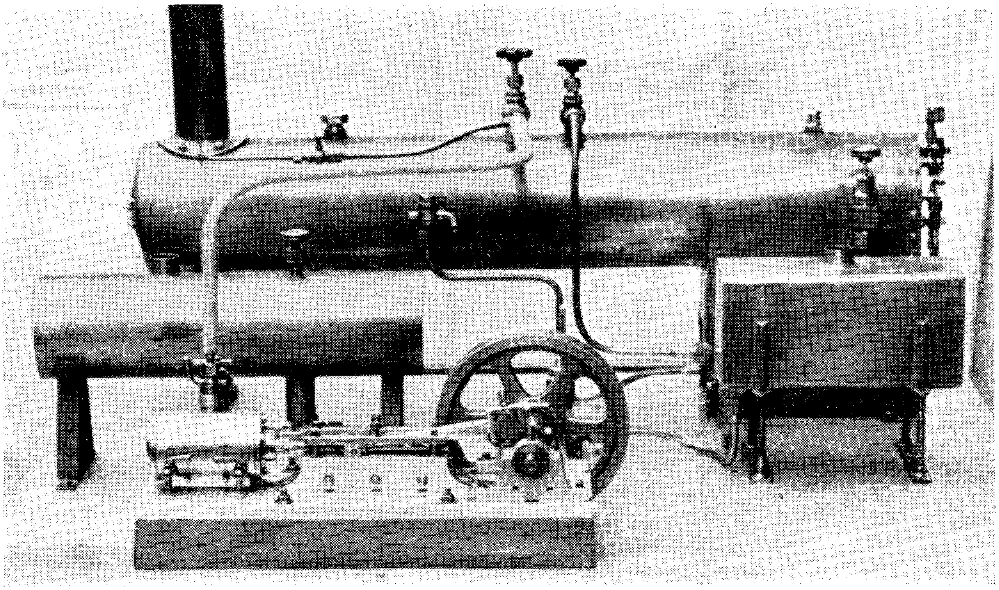
With the fitting of a "foot-piece," the cylinder was about complete and attention was turned to the guide bars and block, which were cut by hand from the steel plate, scraped dead smooth and parallel, then drilled and bolted up, using a piece of the dural plate as a distance piece. This required less manual effort and was more accurate than trying to cut and slot a solid block.



Two views of the horizontal steam engine

Crank brackets now received attention. These were sawn and filed to shape from the piece of dural, bolted together and then put in the three-jaw with heaps of packing and bored for the main bearings. The soleplate was next shaped up again using a piece of the dural. When filed to shape the engine centre-line was scribed thereon and from this datum all holes were marked and drilled, with the exception of those for the crank brackets and the crank pit cut away.

Next stage was to start assembling the pieces. The cylinders, complete with piston and a long temporary rod with gland packed, was clamped to the soleplate and lined up. The stud holes were then drilled, using those already in the soleplate as a jig. The cylinder was screwed down, the correct piston rod, complete with crosshead, was fitted, the guide block was placed under the crosshead, located in its correct



Another view of the model stationary steam plant

position and the stud holes drilled and tapped. The top guide bars were now added, scraping away the tight spots.

Attention was next turned to the crank end. The connecting rod was assembled complete on the crosshead, then a straight piece of silver-steel pushed through the crank brackets and big-end bearings. When the rod could be rotated freely in all bearings with the brackets clamped tight, holes were drilled through both soleplate and brackets at one setting and bolts fitted.

It was now time to do the one job that had been continually "put off," i.e., the production of the crank. It, was, for simplicity, decided to use the built-up method, and the webs were filed dead flat and square, heated over the kitchen gas stove and soft soldered together, cleaned up, marked out carefully and centre-popped, then bolted to the vertical slide and carefully drilled. Next, silver-steel rod was chucked in the three-jaw and turned down to form the required shoulders. The pieces were then pressed together in the vice, and 6-B.A. screws were fitted as dowels. When the crank was fitted with all bearings and tightened down it could be rotated as freely as the straight rod.

The fitting of eccentric, rod, valve and the odd jobs were next completed and all got ready for steam trials. Everything behaved exactly as it should have done, the "tick over" being lovely to watch, the rather heavy flywheel no doubt adding to such smooth running.

For the time being all is packed away, the "change of station" having come round again. At the next stop it is hoped to complete a dynamo for the engine to drive.

The photographs are by another "Hobbies Merchant" whose den, to the average model engineer, looks more like a chemical laboratory than a workshop.

(Photographs by GLAZIER, R.A.O.C.)

Miniature Slide and Strip Projectors

(*Continued from page* 360)

side of the bracket, to ensure that the face of the housing is vertical and fits snugly against that of the lamphouse.

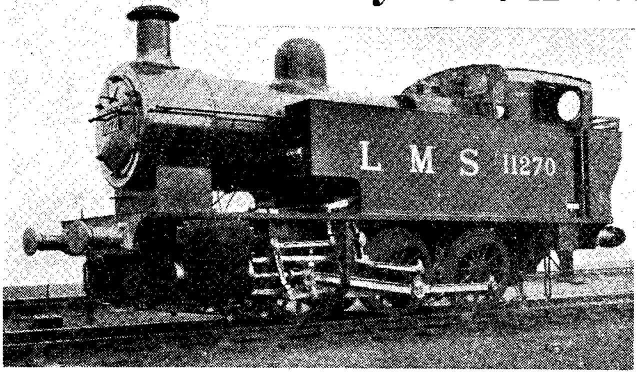
The two holes for the rods which carry the lampholder assembly are then drilled and tapped, also the hole for the single locating screw over the condenser aperture. A special steel screw should be machined to fit this position, the length of the plain portion under the head being equal to the thickness of the lamphouse casting at this point, so that it fits over the screw without play, when in its normal position. The bearer rods are plain lengths of $\frac{3}{16}$ in. steel or brass rod, screwed 2 B.A. at the extreme end to fit the tapped holes in the housing face, and they should be exactly parallel in both planes when screwed home. These rods fit the rebate of the lamphouse aperture and locate the lower end of it when it is dropped into position.

Owing to unforeseen delays in the preparation of detail drawings, it has been found impossible to include in this issue the details of the light trap for the lamphouse, sectional view of condenser housing, locating screw for the latter, and angle bracket for securing it to the base. These will be given in the next instalment of the series, to be published in the issue of March 30th.

(*To be continued*)

*TWIN SISTERS

by J. I. Austen-Walton



Two 5-in. gauge locomotives, exactly alike externally but very different internally

IT is no good trying to be a prophet on this job, and although I promised you full information on the coupling-rods in this issue, my postbag decrees otherwise, in fact, something very much like a general recapitulation appears to be necessary, which isn't a bad idea at all.

I still continue to get numerous letters regarding the holes in the frames, and quite a few queries about "dummy" and "real" rivets, to say nothing about bolts, temporary and permanent.

A close examination of the letters sent to me, reveals the fact that quite a few of the builders are bent on "real" rivets, and no "dummies" at any cost, and quite naturally they want to get this part of the job done and finished with. Others express favour in the bolted-up type of frames, but are still a little hazy about the number required, the size, and how these fit in with the "dummy" rivets which they, generally speaking, approve.

From a purely personal point of view, I favour the bolted frames every time. Not only does this arrangement make it possible to dismantle the job entirely, but it makes final painting so very easy to carry out. One would *have* to be a prophet in order to foresee every single hole that would be needed in the frames before one could say that the job was completely finished, and as this particular engine has not had a flying start on the drawing board, but is being thought out *and* constructed in time with the present series, it gives a very good reason for keeping the locomotive in a state where it can be handled with the maximum ease.

Let us first of all consider the case for the "dummy" rivets, and where they should be placed. Taking the frames themselves, the single row along the top where the smokebox is going to be, is, from the appearance point of view, quite essential. To consider using these for actually fixing the smokebox saddle, is quite out of the question as it would make future dismantling almost impossible.

**Continued from page 272, "M.E.," March 2, 1950.*

You might like to go to the trouble of making up a number of rivet-headed bolts, only to have the job of fiddling the nuts off each time you wanted to carry out a general service on the engine; and think of the additional trouble you might have with the heads turning round, and nothing but a snap head to get hold of. There is always the man who will persist in making use of round-head screws, but they hardly look the part, and in any case, why go to all that trouble when the internal pipe connections are going to do all that is necessary in the way of location and holding?

Moving down along the frames, there is no other place where "dummy" rivets are absolutely necessary, but where they have been indicated on the drawings, they will do much to make the engine appear exactly like the prototype.

Inside the frames it has been suggested that the sheet-metal stretchers should be fitted with "dummy" rivets in all places other than those chosen for either "real" rivets or bolts, and to make this point finally clear, these are my recommendations for satisfactory fixing holes, both *temporary and permanent*

No. 1 stretcher, four bolt or rivet holes, one at each corner or at the ends of both rows of rivets indicated, as shown on the drawing. The same applies to No. 2 stretcher. No. 3, No. 4 stretcher and the central diaphragm should first be riveted together permanently using all the rivet holes shown, and with "real" rivets; thus making up a "sub-unit" of the three parts. The fixing of this unit to the frames is done by making use of four rivet or bolt holes in the No. 3 and No. 4 stretchers, just as you did with the first two stretchers, and with another four in the diaphragm part, making a grand total of twelve fixings for the unit. The four rivets or bolts that pass through the No. 4 stretcher part, also pick up with the outside bracket that is to carry the running boards and side tanks.

The No. 5, No. 6 stretchers and the rear diaphragm are again permanently riveted together to make another "sub-unit," and require a twelve-bolt fixing, plus another two bolts for the

fixing point on the rear buffer beam, total, fourteen bolts. Again, the holes for the rear outside brackets for running boards, coincide with the holes in the No. 5 stretcher.

If you have made up your mind to rivet rather than bolt up your frames, resist the temptation to complete this just yet, and continue to keep things together with service bolts ; as soon as it is fairly clear that no more dismantling will be necessary, I will pass on the word in these articles.

Now let us return to the No. 1 and 2 stretcher positions. The drawing shows two rows of holes, countersunk on the *outside* of the frames. When the time comes, the man who wants " real " rivets on the job, will be able to put these in, leaving a flush finish outside the frames. The cylinders will sit *between* these two rows of holes, leaving a small margin of space between the rows of rivets and the ends of the cylinder block. This leaves the " bolting-up " man with a number of alternatives—to fill the unwanted holes with " dummy " flush rivets ; to tap the holes, and fit " dummy " hex.-headed bolts, simulating the cylinder fixing as on the prototype, or to make up 16-gauge strips, about $\frac{3}{8}$ in. wide, to bolt on to the frames and to still further simulate the actual cast-on flanges that form part of the cylinder casting on the real job. These false strips would also perform a useful function, as they could be filed to fit closely to the sides of the cylinder, and so help to maintain exact location of the cylinder in addition to its four normal holding bolts. I think that on this score alone, they are worth fitting, and the point should be remembered when the cylinder—shortly forthcoming—is detailed.

As for the buffer beams, I would most certainly use nothing but bolts for fixing. In the event of a really bad smash-up the buffer beam might well get damaged, and require removal for repairs, and, as the frames themselves are strong enough to resist heavy blows, bashing against concrete posts, or other forms of abuse that may by accident or intention, occur, there will be no frame straightening to do. Even without buffer beams in place, this frame design is as strong, or rather, *stronger* than the more usual form of construction—a fact that was, no doubt, not overlooked by Sir Henry Fowler when he designed the engine, and which should be equally as obvious to anyone with any mechanical sense at all.

I have made up a set of stainless-steel bolts for all frame fixings ; the holes to be used have been opened up to 3/32 in. and the bolts are 7 B.A. with 8-B.A. heads and nuts for neatness. As the hexagon parts were milled, it was an easy job to make these head sizes that little bit smaller, and with the machine so set, it was just a matter of turning the handle until the job was done. I am not suggesting that you should use stainless-steel for this—its just that I like to use it every where, but *some* high tensile steel is a great advantage for this job.

Now we can move on to the axles and springs. I have quite a number of letters on the subject, one from a man who describes himself as a " mug " at the game, but publicly, I disagree with him on this point. He tells me the usual " success " story, *and* after the very first try, and adds that the bearings work exactly as promised.

The main difficulty appears to have been, with many who have written in, that the rollers cannot be obtained. It is a case of some have and some haven't, and information passed to me is a bit conflicting in that the successful folk who have given the name of an obliging firm have apparently been more lucky than others who have applied to the same concern without success—it sounds as though one has to do a bit of bending and scraping these days if one wants a mere sixpennyworth of goods.

And so to the wheels and tyres—with emphasis on the tyres. I believe I am the first contributor in this journal, to go right out for steel tyres, and how to machine and fit them. The result is that others who do *not* specify steel tyres appear to want to find fault with them. I have a full set of works drawings for the locomotive under consideration, and I am quite capable of reading them. The wheels *and* tyres as described in these articles are based on good sound locomotive practice, *and having had the pleasure of turning some full-size engine wheels, as part of my trade and livelihood,* I claim to know just something about it. If any reader dislikes my tyres or suggested type of fitting, he is quite entitled to take either an exact copy of the tyre shown on the works drawing, and so find out for himself the disadvantages of so doing, or to make up a design of his own—in neither case will I quarrel with him.

I find that it takes all my time to attend to my own work and worries, without having any over for finding fault with the work and design of others, although very often I *could* do so.

Whilst clearing the air, let me also emphasise that the " Twin Sisters " are real locomotives in miniature, not just engines with only enough to make them work, and no more—however good these may be in their own particular class. Never before in the history of this journal, or any other journal, has a small locomotive been described in such accurate detail (how well I know it !) so that any claim to " the original " in this series is just pure bunkum, and if any man can produce an engine more like the type here described I will openly and publicly withdraw and publish the facts for all to see—Ah, now I feel *much* better !

Just in case of any further outbreak of " I thought of it first," my next engine will have a new poppet valve-gear, having a simple constant exhaust event covering all stages of notching up, and without a lot of complication. It will be capable of being operated efficiently through either Walschaerts or Stephenson gear, and with no gearwheels, sliding cams or other stumbling blocks to worry about. The difficulties of large waste pockets of steam have been overcome, and the actual passages are little more than direct ports.

I think any man, capable of making the ordinary type of slide valve, should be able to tackle this job without any fear at all—that is about all I am prepared to say at the moment.

Let's get on with the water pump problems. These consist mainly of requests for details of fabricated parts in place of castings, otherwise I have heard of no actual troubles. Friend Duncan and I made up all the pump parts on the fabricated basis, and it caused us no worries

at all, and looked very clean when finished (the pumps—not us !).

To make the pump bodies, cut out pieces of brass or steel plate to the same outline, drilling a ½-in. hole where the lower suction chamber sticks through. Turn a simple bobbin to the shape of the cylinder portion, or pump body proper, leaving it solid for the time being. File a flat on one side of this which amounts to little more than reducing the larger diameter to the level of the main barrel, so that it will lie flat on the plate. Now mount it up in the four-jaw chuck with the flat either outwards or inwards, and bore a ½-in. hole transversely through it, the same distance from the small end of the barrel as the hole in the plate is from the back edge ; make the hole a light drive fit for ½ in. Now turn up a plain piece of ½-in. bronze rod the total length from the top of the delivery chamber to the bottom of the suction chamber, including the chucking piece allowance, just as shown for the cast version of the pump ; this rod should, of course, be a light drive fit in the barrel. Knock the rod into the right position in the body, and push the lower part through the hole in the plate portion. The job is now ready for silver-soldering. When this is done, carry on with the machining, just as you would with the cast pump.

To fabricate the pump yoke, turn up the barrel portion, and if you have a milling machine, mill a groove ¼ in. wide and $\frac{1}{16}$ in. deep into which you can squeeze the lower part of the yoke, which you can make from a piece of ¼-in. brass or bronze plate. If you have no milling machine, a simple flat along the barrel portion will provide a seating on which the yoke top will stand during the silver-soldering operation. For further security during the brazing operation and to avoid the most annoying experience of having the top part " float " on the molten flux—usually just at the critical moment, drill a small hole through the top of the arch of the yoke, and continue with a tapped hole in the barrel part. Fit together with a temporary brass or steel screw, the head of which may be filed away after the silver-soldering operation.

I have already given hints on finding the position of the yoke unit on the pump plunger, and for further guidance, if you have adhered rigidly to dimensions, the plunger should protrude equally from both ends of the yoke barrel, so if you try it up in this position for a start, you will probably find it works out to plan. The only snag in the yoke may arise through the softening of the brass during the brazing, causing the weaker side of the yoke fork to bend at the root. When the pump was laid out, it was clear that there was not too much room to spare, but now that two versions of the pump have been made and tried, it is found that the ¼ in. width at this curved side of the fork can be increased to $\frac{5}{16}$ in. without any danger of fouling. The *ideal* material here would have been cast iron, except for the rust bogy, but I don't expect anyone to have trouble in this quarter, even with a fairly soft brass yoke.

I had almost forgotten the leaf springs. Not a great deal of trouble in this department, now that the leaf thickness question has been corrected and explained. One quite reasonable grumble came from a builder who pointed out that the $\frac{1}{16}$ in. thick buckle, when drilled, tapped and countersunk on the top, did not leave over much of a hold for the central bolt, even after the silver-soldering. I have not yet been notified of a failure in this respect, but if you feel at all in doubt about the strength, then fit a domed head bolt in place of the flush stud—it makes very little difference to the look of the job anyhow.

Underneath the spring, and screwed into the top of the axlebox is a fitting having a side entry hole for the oil supply. This hole should face inwards, that is, towards the centre of the engine (quite a large number of builders have asked about this little forgotten point). Ultimately, tiny brass elbows will be screwed in, which will be turned to point either to the front or back of the engine, according to the decided run of the oil feed pipes. There is nothing else on the spring trouble list except the rear springing equaliser beams, and this can hardly be termed a trouble. One of our most keen and ardent builders has told me that he has fabricated these in three parts—the two outer parts being cut out where the panelled relief is found in the cast form of beam, and the centre part being left solid, after which the three parts are silver-soldered together, just like a three-ply sandwich.

This should make a good, clean job. I used castings for my own engine, supplied by Kennion Bros. and they came up very well and were quite clean and true to shape.

The next bit of real " misleadery " is pretty astounding, but discovered (I hope) in time. It refers to the brake gear, and is in respect of " Minor " only, or engines without steam brakes.

I refer to the omission of the main crank, which would engage with the steam cylinder, and tell builders to make up a plain sleeve to take the place of the crank. This is not so, and a crank is still required, but without the long arm fitted. This will leave the same made-up half sleeves with a short crank arm in the middle, so just make a link with the long arm and its disc end excluded, the rest being to the details on the drawing.

The brake stretchers are shown having peg ends ⅜ in. long. Here again I feel that the dimension should be ¼ in., and having made my own to this new dimension, and finding it in order, I pass the correction on without further comment.

Now for some extra hints and tips relating to the brake hangers and shoes. Having made these to the drawing, offer them up to the hanger brackets. Don't be afraid to carry out a little fitting work if you find they work too tightly, or if in the bending of the brackets on the frames, you misjudged your throat clearances, or left too much internal radius in the inside of the bends. There is plenty of " meat " on the top end of the brake hanger, especially with the long sleeve silver-soldered in, and the loading, even with the brakes hard on, is really very slight. It is most important to get the hangers to swing loosely on their pins, and quite an appreciable amount of side swing or wobble is almost a certain requirement. Allowances have been made for the wheels and axles to " float " sideways, and unless the hangers and shoes follow this wheel

movement to some extent, there will be scraping trouble, even when the brakes are " off."

Next, see that the shoes are quite free on the hangers. The extent of the freedom required will be seen when the hanger and shoe are in position, when it will also be convenient to see that the hanger has sufficient freedom to allow a good " off " position without moving back far enough to touch the adjoining wheel.

The brake shoes are shown with a stop peg which can be filed down to allow the right tilt for the shoe, and to prevent it swinging so far down that its top edge trails the wheel tyre when the brakes are in the free position. It may not be necessary to fit the pegs at all, and I suggest you try all the parts in place, and carry out the tests suggested before resorting to the peg fitting. The prototype has similar stops in the shoes, so there will be no need for red faces if your friends catch you at the job of fitting pegs.

The brake cylinder position may necessitate the removal of the heads of one or two of the rivets on the forward edge of the rear diaphragm —just chip off the heads affected, with a small flat chisel, leaving the rest of the rivet in place.

The drawing also shows the hexagon-headed set-bolts passing through both the diaphragm plate the and cylinder cover, and if you find that there is no room to accommodate the two bolt heads where the holes break through, very near the foot of the No. 5 stretcher, then countersink these two holes in the cylinder cover only, and fit short screws which will not need to go through the diaphragm at all. The other four holes should be carried through, just as shown on the drawing, and as the working pressure on the cylinder will always be in an upward direction, the remaining four bolts will be quite sufficient to hold the cylinder firmly in all circumstances. You can use the cylinder cover as a drill jig, remembering to leave out the drilling of the two holes mentioned.

The brake cylinder plunger is shown with a $\frac{3}{16}$ in. diameter stem, and as this passes through a $\frac{1}{4}$ in. hole in the trunk member of the cylinder assembly, and has only to provide free air clearance past the rod, you might increase the rod size to 7/32 in., or a little over. This would have the effect of giving the plate part of the piston assembly a slightly improved seating.

Both the sets of brake gear on the two engines back here, are finished and work according to plan, and as at the time of going to press I can find no other alterations or improvements to offer, we will leave it at that.

(To be continued)

" L.B.S.C."

(Continued from page 357)

time again, on the grounds that with the specified valves and setting, they never open fully on the steam side. They are not intended to—but what the critics overlook, is that *they open fully on the exhaust side*. What that means, is obvious to anybody who knows anything at all about full-size locomotive practice, and—very important this—is free from prejudice. In some quarters, anything that " L.B.S.C." writes, says, or does, *must* be all wrong, because I don't go by " the book," preferring the results of my own experimenting with locomotives on the track. An eminent " full-size " locomotive superintendent told me, in my own workshop, that more useful data could be obtained by sending a locomotive out on the road, with a driver and fireman who knew their business, plus an inspector to take the notes, than by any other means ; and he gave me, in confidence, a few illustrations which, if I disclosed them, would properly " put the cat among the pigeons." 'Nuff sed !

The idea of compressing steam at the end of the stroke, to steam-chest pressure, before the valve opens the port to steam, is an out-and-out fallacy. I'm not trying to be dogmatic ; merely stating facts. Proof ? Sure ! Stick the starting handle in your car, and turn it, especially if it happens to be a cold morning. Wants a bit of turning, against the compressions, doesn't it ? Well now, supposing that there weren't any compressions at all, the handle would turn easily ; you will, of course, agree. Supposing that at the instant the piston arrived at the firing point, the full charge, ready compressed and ready for the ignition spark, could be introduced into the cylinder, and fired. The engine would go far better, and give far greater power, as it would have no compression strokes to overcome ; in fact, two cylinders would do more work than four, as the engine would become a glorified non-compressing " two-stroke." Something like that happens at each end of the cylinder at every turn of the wheels on my little locomotives, which explains one reason why they do the job ; they don't " fire," naturally, but the charge of steam, introduced at the right time, and hot enough to obviate any chance of condensation, does its work by expansion. Ridiculously simple, isn't it ? In the valve-gear of *Lady Vera*, there was a " little bit of something that the others haven't got " !

I note that the question of compound engines has been mooted once more. My three-cylinder Webb compound *Jeanie Deans* is anxious to meet, and have a dust-up with any freak compound of her own size, with any number of cylinders, who fancies its chances at running 2 miles on one firing with an inaudible blast. Finally, an eight-impulse engine, such as *Tugboat Annie*, is far less prone to slipping than any four-cylinder engine with opposed cranks ; the reason being, that the turning movement is far more even.

Queries and Replies

Enquiries from readers, either on technical matters connected with model engineering, or referring to supplies or trade services, are dealt with in this department. Each letter must be accompanied by stamped, addressed envelope, and addressed : "Queries Dept." THE MODEL ENGINEER, 23, Great Queen Street, London, W.C.2.

Queries of a practical character, within the scope of this journal, and cable of being dealt with in a brief reply, will be answered free of charge.

More involved technical queries, requiring special investigation or research, will be dealt with according to their general interest to readers, possibly by a short explanatory article in an early issue. In some cases, the letters may be published, inviting the assistance of other readers.

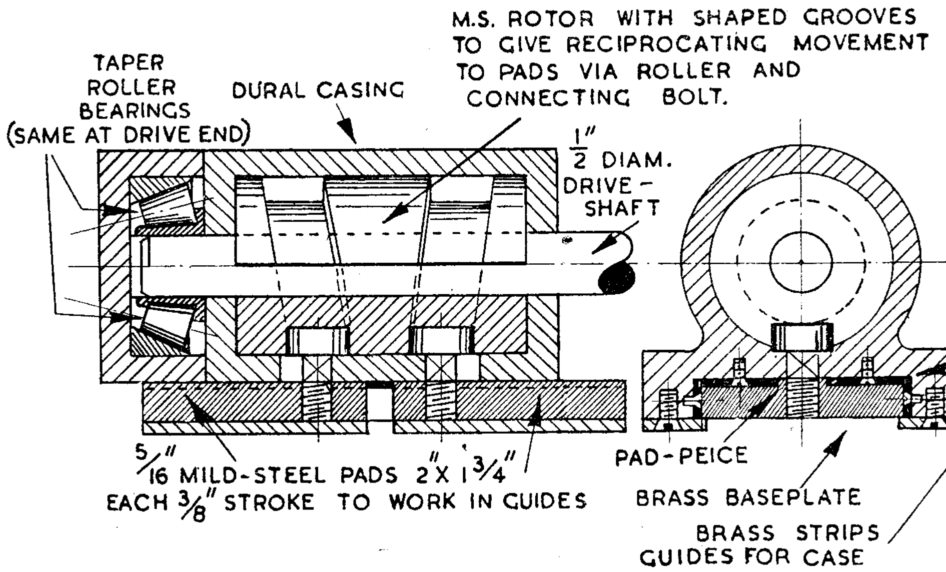
Where the technical information required involves the services of an outside specialist or consultant, a fee may be charged depending upon the time and trouble involved. The amount estimated will be quoted before dealing with the query.

Only one general subject can be dealt with in a single query ; but subdivision of its details into not more than five separate questions is permissible. In no case can purely hypothetical queries, such as examination questions, be considered as within the scope of this service.

No. 9773.—Materials for a Sanding Machine
W.S.G. (Topsham)

Q.—I am proposing to make a sanding machine of the reciprocating type in which two pads work in opposition to one another with a stroke of $\frac{3}{8}$ in. per pad and 2,200 strokes per minute. The reciprocating parts must be kept as light as possible but be of material that will stand up to the work. I give a sketch to illustrate my idea. Can you suggest any lighter materials which could be used in place of that shown for a pad ? I take it that a dural pad-piece working in brass guides would not have the necessary wearing qualities ? In a car engine an alloy of aluminium in the form of a piston gives good wearing qualities working in a cast-iron guide ; would it be possible to have a pad-piece of piston metal operating in cast-iron guides ?

R.—We suggest that in order to lighten the reciprocating parts of your sanding machine, they might be made of a laminated plastic material, such as Tufnol which is considerably lighter than metal but has good mechanical properties, and also excellent resistance to wear, being practically self-lubricating. Alternatively, they may be made of a very light alloy such as Elekron, or the parts may be lightened by recessing or grooving the parts which do not actually serve any useful purpose in taking wear. We may mention that the alloys used for car engine pistons are only satisfactory when kept continuously lubricated, and that the matter of heat resistance and low expansion is generally regarded as at least as important as resistance to wear. We do not think that such alloys would be the most suitable for your particular purpose.



No. 9771.—Paint for "Maid of Kent" R.R. (Bridlington)

Q.—I have a "Maid of Kent" nearing completion and am going to make it as near the prototype as possible. Could you please give me some advice as to the painting of this, in the Southern "L1" class style.

R.—The main colour was a medium olive green originally, for the boiler, cab sides, tender, valences and wheels. The lining consisted of a rather narrow black border round the edges of the tender body, cab sides and splashers, with a white line on the inner edge, next to the green. The valences were edged with black and also had a white line on the inner edge, next to the green. The wheel spokes and bosses were green, the tyres were black and the bosses of the wheel had a black disc in the middle, with a white line round the outer edge. There was also a white line round the inner edge of each tyre. The main frames, above and below footplate level were black, as was also the smokebox and chimney. The buffer beams were red. All lettering and numberings were in plain yellow paint.

Boiler bands were black with a white line each side.

No. 9779.—Driving Twin Propellers A.M.D.G. (Stirling)

Q.—I have completed a model motor torpedo boat, 3 ft. 8 in. × 10 in. beam × 8 in. draught, which is driven by twin screws. My problem is how to drive the twin propeller. If this is done with the use of a gearbox as described in THE MODEL ENGINEER of April 6th, 1929, is there not then a loss of power?

R.—We recommend the use of a simple gearbox with the gears running in an oil bath, and if the gears are accurately made and adjusted, very little power should be lost by the use of this gearbox. This method is used by most constructors of twin-propellered boats and works quite satisfactorily. The only alternative, of course, is to use two separate engines, but in any case, it would probably be desirous to gear them together to avoid variation in speed, which would cause the boat to alter course.

No. 9769.—The "Seal" 15-c.c. Engine A.B.L. (Sheffield)

Q.—After many hours of pleasure in constructing the "Seal" 15 c.c. I have reached the point where I require an ignition coil and condenser [?]. As I have had no previous experience of miniature equipment, I wonder if you would be good enough to advise me on a suitable coil and condenser (if required), and where they may be obtained. The only parts of the engine I am doubtful about are the cylinder bores. They are a bit bell-mouthed, as I had left too much to lap out; also, it was my first attempt at lapping. However, I have had the engine running (or rather, driven) on the lathe boring table for about an hour with graphited oil, and it feels quite "sweet" without being sloppy. By the way, what about the play and point clearances—are they critical?

I had trouble with the plastic which I used for the contact-breaker arm, as I cracked two, although they were made from linen base, and I finally built up one in brass with a steel plate carrying the point rivet, and an insulated cam heel or pivot bush.

R.—With reference to the contact-breaker arm, it should be quite satisfactory to use one constructed from metal, provided the cam heel and pivot bush are made from fibre or bakelite.

The sparking-plug gaps, as set by the makers, are generally quite satisfactory, but if you decide to check up on them, they should not exceed 0.015 in., and may be somewhat smaller than this with advantage in some cases.

The contact point clearance should be approximately 0.005 in. Your engine should be quite satisfactory if it has a reasonable compression on all cylinders, and the valves are tight and correctly adjusted. There are several of these engines running quite well at the present time, and one of them which was shown running at the "M.E." Exhibition was quite a revelation to a number of people. A suitable ignition coil and condenser can be obtained from either of the following firms: Craftsmanship Models Ltd., Norfolk Road Works, Ipswich; Miniature Ignition & Accessories, Kirby Close, Ewell, Surrey; or Z.N. Motors Ltd., 904, Harrow Road, London, N.W.

No. 9775.—Converting a "Dynamotor" N.B.W. (Southport)

Q.—I recently bought an *ex*-W.D. "Dynamotor" with the idea of converting it into a motor to run on 230 volt, 50 cycle, a.c. current, to drive a small lathe. The field pole shoes are detachable, being attached to the body of the machine by set-screws, and are laminated, whereas the body of the machine is not laminated. The machine has been connected in every way I can think of, without much success. I have come to the conclusion that I shall have to rewind part or all of the machine, and should be very grateful, therefore, if you would kindly let me have particulars of the gauge of wire and the number of turns required for winding the field and the armature. If you can also suggest any system which would not entail rewinding the armature and which would give about 1/6 h.p., I should be glad. Could anything be achieved by rewinding the field only, and short-circuiting some of the bars of the high-voltage commutator?

R.—As your motor has a solid frame with laminated pole, it is unsuitable for a.c. operation. To operate on an a.c. supply it is necessary for the whole of the field frame to be laminated. These machines are designed purely for d.c. working; you could probably get it to run for short periods by disconnecting the shunt winding entirely and reconnect by using the compound field connected in series with the L.T. armature, but the whole set-up would have to be experimental. It is not possible to suggest a field winding without the knowledge of the armature turns, and even then if this alteration were attempted the performance would not be satisfactory.

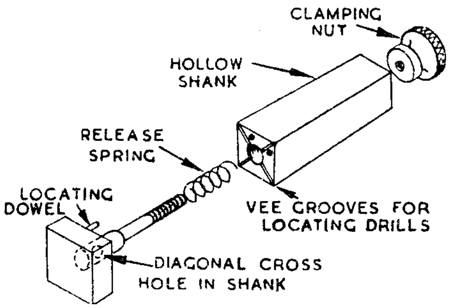
PRACTICAL LETTERS

Tool for Grinding Small Twist Drills

DEAR SIR,—I note your request in a recent issue regarding the sharpening of small drills.

Mr. W. Thompson of the Salford M.E. Club first drew my attention to the article and the workmanship he put into the one he made was far superior to mine.

To sharpen, the drill, say a No. 70, is placed diagonally under the spring-loaded top cap and the nut at the base of the tool tightened. There are two V-grooves under the cap, one for small and one for very small drills. The tool is then



laid on an oilstone and first one face and then the other given a rub. A watchmaker's eyeglass is used to set the drills.

Drills so sharpened have flat faces instead of curved ones, but for that matter so have many small commercial ones.

The tool suits me well and does all I require, but I do not know whether it will be quick enough for our American friend.

Yours faithfully,

Pinner. C. C. ALLISON.

Colouring of Metals

DEAR SIR,—May I express my thanks to Mr. R. E. Mitchell for taking so much interest in my article on the "Colouring of Metals" (THE MODEL ENGINEER, December 8th, 1949, pp. 740/1) but whilst the facts stated in his letter are true (THE MODEL ENGINEER, January 19th, 1950, p. 93) I cannot fully agree with his conclusions.

With reference to dipping the work in oil before immersion in molten nitrate at 325 deg. C., this data is mentioned in the paper "Blueing and Browning Steel Particles," by Sidney Cornell, published in *Chemical & Metallurgical Engineering*, February 16th, 1921, and also in the *A.S.T.M.* "Metals Handbook." The strong oxidising nature of molten nitrates is well known, but the evolution of oxygen from nitrates is an endothermic process, and at the temperature specified, in conjunction with the small amount of oil (note that I said "dip in hot, light oil and drain") is unlikely to cause trouble. At any rate, the bath has not "blown up" on me when I have used it.

Secondly, regarding mercury, I did not include a stringent warning of the poisonous nature of mercury and all its compounds because surely most people know this. I cannot agree that the picture should be painted in quite such dark colours. After all, when the dentist fills our teeth with mercury amalgam, this contains about 30 per cent. Hg., which is actually in the mouth. A few small pieces of the amalgam usually roll about in the mouth until removed, increasing the hazard. Some cases of Hg poisoning have been attributed to denture fillings, and also to the use of vermilion as a pigment in dental plates (a substitute pigment is used nowadays). But, particularly if the solution is used, I do not consider the process highly dangerous.

As for the risk of "season cracking," the second method given is in fact the "season cracking test," as used in metallurgical work! Please note that I stressed that the work must be annealed, carry very little stress in service, and the effect was suitable for decorative work only. Therefore, whilst agreeing with the truth of Mr. Mitchell's remarks, I feel I must, with all deference, disagree strongly with the rather alarming picture presented.

Yours faithfully,

Southsea. D. BIRCHON.

Magneto Impulse Couplings

DEAR SIR,—Reading through the "Queries and Replies" section of THE MODEL ENGINEER recently, and noting a reader's (9759) difficulty of starting a petrol engine fitted with a magneto, it occurred to me that a solution might be arrived at by fitting a model reproduction of a magneto impulse coupling (or impulse starter) such as was manufactured by the late firm of Messrs. Norths "Watford Magnetos"—and possibly other firms.

My reason for mentioning this is because the making of such a gadget should make an interesting model engineering job—particularly from an experimental point of view—for those interested in petrol engine work. (I am a "Live Steamer" myself.)

Furthermore, so far as model engineering is concerned, it may prove to be a novel idea, because although I have read my MODEL ENGINEER from cover to cover for many years past, I cannot recall the subject of impulse starters as applied to model work ever being mentioned by any writer on petrol engine subjects.

Yours faithfully,

Watford. G. A. CLARK.

(A description of the impulse coupling was published in THE MODEL ENGINEER some four years ago, and can also be found in our handbook, "Ignition Equipment."—Ed., "M.E.")

Any Answers, Please?

DEAR SIR,—I wonder if any reader can kindly tell me where an 8 h.p. Robey compound portable engine may be seen?

Yours faithfully,

Sheffield. G. H. SWANN.

Internal Combustion Turbines

DEAR SIR,—May I be allowed to comment on the remarks of Mr. K. N. Harris on the above subject ?

With the general trend of Mr. Harris's remarks I am bound to agree; one or two points, however, might be pursued a bit further with advantage. His definition of thermal efficiency for instance, is fine, so far as it goes, but let us examine the term "usable power" a little more closely as applied to traction.

Whenever, in my observation, a protagonist of the i.c. engine quotes thermal efficiency he invariably quotes his power figure at the *engine shaft*, but a *true* comparison of the overall thermal efficiency must take the power figure at the driving wheel(s). In the case of a steam locomotive the driving-wheel axle *is* the engine shaft and there *are no transmission losses*, so for "usable power" in the case of vehicles of any description, including locomotives, let us substitute power at the driving wheels. The difference between that and power at the engine shaft can be and often is very considerable.

It seems to me that the statement that the i.c. turbine is ahead of any steam plant in thermal efficiency is a bit sweeping; on any figures I have seen it is a very long way behind any fairly modern i.c. piston engine, as is to be expected on an equivalent compression ratio under rather than over 4 to 1 on which ratio the thermal efficiency of piston engines was not so great and their losses were much lower than the i.c. turbines. There are in existence on the other hand, steam driven power stations utilising steam at 3,200 lb./sq. in. and 900 deg. F., in turbo generators, multi-stage, and without transmission losses; under these conditions the overall thermal efficiency should be pretty good and certainly on terms with that of the i.c. turbine.

To those Mr. Harris is addressing, his remarks on the power absorbed by condensing plants are misleading; it is true that they require power but it is equally true that they enable the main engines they serve to develop considerably more power from the same steam supply than would otherwise be the case and have a large favourable credit balance in the assessment of the overall thermal efficiency of the plant. It is again a fact that to give a boiler forced draught requires power but again results in a higher overall thermal efficiency than the use of "natural" draught.

The thermal efficiency of the steam locomotive as we know it today is notoriously low—it is quite other considerations which have kept it in service and will, I believe, keep it so for some considerable time yet. Reasons for the low efficiency are well known and obvious to engineers; for the benefit of others, one might instance too low working pressure, ditto superheat, inadequate expansion ratio, limitations imposed by valve gears on attaining most favourable valve events, excessive clearances, heat loss incurred by passing live and exhaust steam through the same ports and passages, inevitable leakages past both pistons and valves whose pressure differences are high (in single expansion these are complete loss) back pressure (no condenser vacuum), etc.

I entirely agree with Mr. Harris on the desirability of really drastic improvements involving fundamental changes in design if the steam locomotive is to hold its own in these days of appallingly high fuel costs. The times when coal represented a comparatively small proportion of running costs seem to have departed for good, and with them the days when locomotives not fundamentally different from Stevensons "filled the bill."

Enginemen like the simple engine, even compounding was unpopular with drivers and "shops" and doubtless from their angle the existing single expansion "simple" engine has many important advantages; but conditions have changed and if locomotive engineers cannot evolve steam locomotives of greatly improved thermal efficiency I, too, fear that internal combustion abortions, turbine or piston with their equally abominable transmission systems, or the soulless electric eyesore, will replace them as they have already replaced too many beautiful power plants of a departing era.

Yours faithfully,

Seascale. K. A. HELLON.

Efficiency = 100 per cent. ?

DEAR SIR,—Such is the enthusiasm of your readers, he is indeed a brave man, in my opinion, who ventures figures and formulae to be published in "Ours."

One slip, and down come the wolves, and a jolly good thing, too! It was, therefore, with a certain amount of hesitation that I quoted figures in THE MODEL ENGINEER dated December 29th, not being very sure of my maths. I double-checked my figures.

Now I am told, in the February 9th issue, by A.W.P., that I have slipped up, and, unless a printers' error has occurred, informs we unmathematical readers that twice 0.6 is 0.12! I gather it isn't a printer's error or the "0" wouldn't be there ?

When I did put my figures forward, I *did* slip up, not, at the time, being in possession of THE MODEL ENGINEER dated June 15th, 1939, with K.N.H.'s figures, or was it Mr. Keiller's ?

However, I took my M.E.P. as 100, but on working it out with 65 I get

$$\frac{65 \times 0.083 \times 0.196 \times 1900 \times 2}{33{,}000}$$

therefore giving the I.H.P. of the locomotive in question as $\frac{1}{8}$th, or as near as makes no odds, giving it a mechanical efficiency of 100 per cent. !

Now, obviously somebody has slipped up, if it is me, will some kind person explain where ? I have even press-ganged outside help in working this out to see if I have made some ridiculous little mistake, but the answer always comes to $\frac{1}{8}$th. I am not writing this with the mind of a man who is convinced he is correct and is attempting to belittle others who try to prove him wrong. I think my figures are correct, I think the answer is $\frac{1}{8}$ h.p., I think it is a very good engine, but I *don't* think it has a mechanical efficiency of 100 per cent.

Yours faithfully,

Iver. H. BRISTOW.

Hot Air Engines

DEAR SIR,—I have read the query by C.W.B. (Rugby) on the above subject, and would like to add one or two points. Although not of great power compared with modern prime movers, it is possible by a careful selection of the right metals to obtain surprising results. Good design and workmanship, of course, are also necessary. During the last three years I have carried out many experiments comprising about ten different models, single-acting, double-acting, vertical and horizontal, and believe that there is a real usefulness in hot air engines.

One point is omitted in the reply given, i.e., the return stroke of a single-acting engine also has an impulse derived from the difference between atmospheric pressure and partial or complete vacuum behind power piston.

Yours faithfully,

Rutherglen. "CORVUS"

CLUB ANNOUNCEMENTS

Chesterfield and District Model Engineering Society

An exhibition is to be held in the Market Hall on the 7th-10th, June inclusive which will be this society's first effort since the participation in the George Stephenson Centenary.

A number of good prizes have been promised as awards in all classes, by friends of the society.

Interesting and instructive meetings are held each Tuesday alternatively at Bradbury Hall and at the Workshop in Walton Road, and any new member or lone hand can be assured of a hearty welcome.

An excellent film show was recently given by the kindness of British Railways, L.M. Region and thoroughly appreciated by members and friends.

Will all those interested, and other societies please note the new hon. secretary's name and address: MRS. B. CHAMBERS, 78, Heaton Street, Brampton, Chesterfield.

Brighton and District Society of Model and Experimental Engineers

A hearty welcome was given to Mr. E. T. Westbury when he visited the above society on February 13th to give his lecture on "Suitable Machinery for Model Ships." In a most interesting and instructive talk, Mr. Westbury dealt with all kinds of marine engines from simple to intricate steam plant, i.c. types, and diesel, each example being illustrated by photographs projected by the club's episcope. Mr. Westbury enlarg d upon the good and bad points of each and a number of the actual engines were on the table, and were closely examined afterwards by a crowd of eager enthusiasts. When the meeting was thrown open, Mr. Westbury dealt successfully with a barrage of technical questions and also steered the discussion very tactfully through the difficult subject of commercial engines and boats. With a hearty vote of thanks for a most enjoyable evening, we look forward to the next talk from the distinguished and popular visitor.

Hon. Secretary: H. G. ACHARD, 48, Aldrington Avenue, Hove, 4, Sussex.

Stockport and District Society of Model Engineers

The above society is now nearing the end of its fourth year and can claim a roll of some 60-70 active members.

It was not deemed practicable to hold an exhibition this year but much useful work has been done and several members will have exhibits at the Northern Association's exhibition this month.

The annual general meeting will take place at the Foresters Hall, Stockport, on Friday, April 14th, 1950, at 7.30 p.m.

Hon. Secretary: R. A. CARRUTHERS, 29A, Frewland Avenue, Davenport, Stockport. Tel. Gt. Moor 4770.

The East Sussex Locomotive Club

At our meeting on Wednesday, February 22nd, work on the track was continued. As hon. secretary, I should like to take this opportunity of recording the amount of work put in by all members on the conversion and extension of the track. Such was the effort, that 140 ft. of track was converted to 5-in. gauge and extra sections made, to make up a total length of 180 ft., in three sessions. This included making all the tie-bar extensions, new tie-bars, drilling the new rail and making all new fishplates. Member P. Uridge and myself completed the job on a recent Saturday, when we assembled the final sections and laid the complete track, which now includes a curved section of 60 ft. radius.

We all look forward to a good season and invite our friends to meet us in action at most local fetes. The first of these being on May 27th.

Hon. Secretary: L. J. MARKWICK, 577, Bexhill Road, St. Leonards-on-Sea.

Grimsby and District Society of Model and Experimental Engineers

At the annual general meeting held at the Grange Hotel recently, the following officers were elected:

Chairman, Mr. O. W. Bellamy; vice-chairman, Mr. R. Bray; treasurer, Mr. W. Cullum; secretary, Mr. J. Tarttelin. Three members of committee were also elected. They were Mr. Parton, Mr. Burgess and Mr. Robinson.

It was announced that Mr. Thickett, our president for many years, had expressed a wish to retire, having recently celebrated his 81st birthday. Many tributes were paid to him for his service to the society and his great interest in our activities. The new president is Mr. F. R. Lloyd, and the vice-president is Mr. R. C. Bellamy.

The chairman then gave a summary of the past year's work. The railway track was well under way and it was hoped that the car racing track would be completed by early summer. The finances were sound and the workshop was now very well equipped. Membership was at a very high level and continuing to rise.

When the various projects in hand were completed, the society would be in a very enviable position.

Hon. Secretary: J. TARTTELIN, 101, Ladysmith Road, Grimsby.

Ickenham and District Society of Model Engineers

By the courtesy of the Westinghouse Brake & Signal Co., the members were entertained on February 24th to a lecture on "Signalling," from the early days of disc and semaphore, right up to the present three- and four-aspect, and searchlight signals in use on our railways today. Suitable slides showed the progress made, early types of manual lever frames being contrasted with the modern power-lever and push-button control. It proved a most interesting evening. Many more of a similar nature will follow for some weeks to come and we cordially invite new members and visitors to our meeting place at the Memorial Hall, High Road, Ickenham, any Friday evening at 7.30 p.m. Further details may be obtained from our Secretary, A. DUNN, 27, Ivyhouse Road, Ickenham.

Colchester Society of Model and Experimental Engineers

The fortnightly "get together" meetings are proving very popular and are well attended.

The meeting for March is on Thursday, the 23rd, "Old-time Steam Engines," and the speaker will be Mr. A. F. Watson, an authority on the subject. The meeting will be held at the Liberal Club, Headgate, at 7.15 p.m.

Everybody interested are invited.

Hon. Secretary: B. D. DOWNES, "Southernwood," Rowhedge Road, Old Heath, Colchester, Essex.

The Manchester Society of Model Engineers

Owing to the resignation of Mr. G. Garvin, the post of hon. secretary has been filled by Mr. A. Carter, who has agreed to carry on until the annual general meeting at the end of March.

We have had several interesting visits recently, including one to the Irwell Rubber Company, which had to be made in the evening and proved too short to see all we should have liked to see.

Although work has not yet begun in Platt Fields, the track is being assembled by several members; their hard work is appreciated by all.

Meetings are held each Friday evening at the Girls' Institute, Mill Street, Ancoats (next door to the hospital).

Hon. Secretary: A. CARTER, 49, Acresfield Road, Middleton.